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ABSTRACT

The use of tests to equate knowledge, experience, and skill with prescribed levels of formal training, and to match people with jobs on the basis of measurable ability to perform them, has received increasing attention by those concerned with manpower shortages in health-related occupations. Basic to the concept of career mobility is the need to evaluate the individual's abilities by proficiency and equivalency tests in order to allow his advancement to the appropriate rung of the career ladder. This document includes an extensive report on testing programs of Federal and state licensure examinations, proficiency/equivalency examinations, and a number of certification examinations of national boards and registries in the medical laboratory field and in other fields. Testing programs in other related fields which are discussed include the U.S. Civil Service Commission Examination, tests of General Education Development (GED) and the Trade and Industrial Teachers' Competency Examinations. A nine-section annotated bibliography includes 108 entries. (Author/GEB)

EQUIVALENCY AND PROFICIENCY TESTING

A Survey of Existing Testing Programs in Allied Health and Other Health Fields

VT013129

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service National Institutes of Health

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EQUIVALENCY AND PROFICIENCY TESTING,

. . . a descriptive compilation of
existing testing programs in allied health
and other health occupations

. . . with an annotated bibliography

Division of Allied Health Manpower
Bureau of Health Manpower Education
Public Health Service, National Institutes of Health
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PREFACE

This booklet is part of a continuing effort by the Department of Health, Education, and Welfare to assist in overcoming manpower shortages which act as constraints on the provision of adequate health care to large groups of Americans.

This effort has included conferences to explore and broaden understanding of the problems; programs to recruit and train entrants into specialized technical occupations; programs to refresh and upgrade competency of specific groups of working technicians; studies to improve the statistical data base for observation of the problem; and programs experimenting with ways to improve and expand utilization of less trained personnel.

One of the most difficult aspects of the problem has been the one to which this publication is directed: how to provide credible incentives, in terms of possiblities for advancement, to those who enter the health occupations on the lower rungs of the ladder. Typically, many jobs in health have been "dead-end streets" except for the few individuals who could leave work and return to school long enough to earn prescribed diplomas, course credits or degrees. The most promising solution to this part of the problem appears to be the further development of equivalency and proficiency testing programs.

Interest in career incentives was crystallized by a conference on "Manpower for the Medical Laboratory," held at the University of Maryland in October 1967. The conference, sponsored by the Cancer Control Program of the National Center for Communicable Disease Control and by the National Committee for Careers in Medical Technology, recommended that "Representatives of the medical laboratory should initiate efforts . . . to develop equivalency tests . . ." Subsequent to this, the Division of Allied Health Manpower contracted with the National Committee for Careers in Medical Technology to review the status of equivalency and proficiency testing as it applies or might apply to the laboratory field. This publication summarizes that review.

Also pursuant to this recommendation, ad hoc committees of laboratory professionals developed proposals for constructing new equivalency and proficiency examinations in the areas of microbiology, hematology, immunohematology, and clinical chemistry. This work is now proceeding under contract with the Division of Allied Health Manpower (for educational equivalency examinations) and with the Department of Labor (for proficiency testing).

If these efforts are successful and the results can be widely adopted, perhaps the important goal of greater job mobility in health-related fields can be rought within reach. Steps leading in the same direction are also being taken in the fields of nursing and physical therapy.

It will be immediately apparent to the reader that very substantial difficulties must be overcome. Not the least of these is the extreme diversity of local, State, and national practices, procedures and standards which determine admission to the various health occupations and advancement within them. However, experience in other fields seems to suggest that problems such as these can be at least partially overcome by the availability of universally acceptable examinations that are reliably administered.

In this entire process, two overriding concerns must be kept constantly in mind:

First, in the search for greater career mobility through the use of testing programs, inflexibility in job definitions can become almost as strong a temptation as inflexibility in the definition of academic requirements. To reject one set of rigidities only to embrace another could result in slight advance.

Second, and above all, the full benefits of greater flexibility in the use of manpower can be realized only if due regard is given to maintaining and improving the quality of the services rendered.

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INTRODUCTION

The use of tests to equate knowledge, experience and skill, however acquired, with prescribed levels of formal training (equivalency testing) and to match people with jobs on the basis of measurable ability to perform them (proficiency testing) has received increasing attention by those concerned with manpower shortages in health-related occupations.

The general magnitude of these shortages is well known. They are becoming more serious as demands for health services increase under pressures of population growth, expanding programs designed to reach all the people, and the spread of new technology.

It is now generally agreed that not all the need can or should be met through programs of training and recruitment. A significant part must be supplied by improving the utilization of people already employed, and by attracting to these occupations many men and women who, though well qualified, are now discouraged or effectively excluded by formal academic requirements. "Medics" returning to civilian life from service in the Armed Forces are an important, but by no means the only, example. The central problem, now widely recognized, is that employment in many of these occupations leads to a *cul-de-sac* which offers no adequate recompense to experience, intelligence or energy.

Better utilization and retention of manpower already employed will depend largely upon the success of efforts to enhance career mobility, both vertically and horizontally. This can be accomplished only by removing as many artificial or unnecessary obstacles to advancement and change as possible, consistent with the maintenance of adequate professional standards of service. In turn, the success of these efforts may be enhanced by the availability, efficacy and acceptance of equivalency and proficiency testing programs for health personnel.

Basic to the concept of career mobility is the need to evaluate each individual's present abilities, regardless of the route he traveled to attain them, in order to allow his advancement to the appropriate rung of the career ladder. Proficiency and equivalency testing programs can serve as a basis for this evaluation. Proficiency testing assesses an individual's knowledge and skills related to the actual demands of an occupational specialty or a specific job. Equivalency testing equates learning gained outside of formal training programs with the requirements of courses that constitute recognized formal training programs.

More attention to the development and use of such tests has been urged repeatedly in recent years by official bodies and professional leaders. For example:

> ..."Methods must be developed to determine whether knowledge and skills acquired in other than formal academic settings are equivalent to the measures of 'satisfactory' performance established in recognized educational institutions."
>
> "The need for equivalency examinations for the allied health professions and occupations is based on the premises that: (1) students should not be required to repeat work they have mastered; (2) objectives of course work can be achieved in other than classroom situations; (3) acquisition of knowledge and skills can be measured by examination and performance; and (4) educational institutions can use the results of these examinations as a basis for advanced placement or academic credit awards."[1]

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[1] Report to the President and the Congress on Allied Health Professions Personnel Training Act of 1966, as amended, U.S. Department of Health, Education, and Welfare, April 1969.

TESTING PROGRAMS IN THE MEDICAL LABORATORY FIELD

This section applies primarily to occupations in the medical laboratory; however, much of it is relevant, as well, to other health fields.

It also includes specific references about the relationship of Medicare regulations to the general subject. These references relate to the laboratory and laboratory occupations. Information about Medicare as related to physical therapists is provided in the second section of this publication: Testing Programs in Other Health Fields

The other principal Federal Government program with a bearing on the subject is that of the U.S. Civil Service Commission, which conducts examinations for various health occupations. A brief explanation of this program is also located in the second section of this publication: Testing Programs in Other Health Fields.

CERTIFICATION EXAMINATIONS

By no means are all of the organizations which maintain registries, conduct examinations or are otherwise involved in the process of certification for occupations in the medical laboratory are represented in this section. Those whose various roles are not specifically covered include:

American Medical Technologists (AMT)
American Society of Medical Technologists (ASMT)
International Society of Clinical Laboratory Technologists (ISCLT)

American Board of Pathology Examinations

The American Board of Pathology has offered certifying examinations in the specialty of pathology since 1937.

In its early forms, the Board's testing program consisted of essay-type written questions and oral/practical examinations in the laboratory. Both sections of the examinations have since been modified. Today they consist solely of machine graded multiple-choice items. Some of these are answers to written questions on theory and practice. Others are diagnoses of slides, photographs, or actual specimens.

The Board now gives two basic examinations, in anatomic and clinical pathology. Both are given twice a year, each time in a different city. The entire battery of tests, which are proctored by pathologists, requires three days to complete. Most candidates take both examinations. They are "Board eligible" (i.e., eligible to retake the examination in case of failure) semiannually over the course of three years.

The examinations in anatomic pathology include: (1) a multiple-choice, written test on theoretical, interpretative and statistical aspects of the subject; (2) a multiple-choice test of diagnosis, using 50 microscopic slides; (3) a multiple-choice test of diagnosis, using projected photographs; (4) the diagnosis of actual surgical specimens, the candidate's rapidity of recognition being based on two multiple-choice questions about each; and (5) a test in cytopathology requiring the diagnosis of 25 projected slides.

In clinical pathology, the examination consists of a multiple-choice, written test on theory and practical test divided into six parts, some of which are written while others require the conduct of laboratory tests and the diagnosis and interpretation of slides. The practical tests cover medical chemistry, medical microscopy, hematology, immunohematology, blood banking, medical microbiology and medical parasitology.

The written questions consist not only of "completion" items, but also include items "classification", "quantitative comparison", "correlation", "variation relations", "cause and effect", "chronologic comparison", and "multiple completion". The written test format in this case is more complex than other written tests discussed in this report.

Practical examinations were changed from performance test to paper-and-pencil tests with slide presentations some years ago because the increasing number of candidates made performance testing unwieldy.

To become eligible, a candidate must meet a number of requirements. He must "possess moral and ethical standing in the medical profession", hold a license to practice medicine in the country in which he will reside, and must "devote professional time principally and primarily to pathology". Further, he must be a graduate of an AMA-approved medical school, or if a foreign medical school graduate, be certified by the Educational Council for Foreign Medical Graduates (see page 29).

In addition he must have five years of training and experience, four of the five in institutions approved for residency training by the American Medical Association, in which he studied anatomic pathology and/or clinical pathology. However, a medical school graduate without such training and experience may become Board-eligible after 11 years of other training or experience in the field of pathology.

Board of Registry of Medical Technologists Certification Examinations

The Board of Registry of Medical Technologists of the American Society of Clinical Pathologists (ASCP), has been examining candidates for certification since 1933.

The first examination consisted of a written essay-type portion, which counted 25%; a practical test, 50%; and the examiner's evaluation of "personal and psychological attributes, endorsements and recommendations, present position, and previous general training," counting 25%.

"Suggested" procedures for the performance test in the laboratory were given the examiners, but no uniform method was provided for evaluating performance. All ratings were submitted to the Board which considered each applicant individually.

By 1937, the certifying examination consisted of written and practical sections only, with equal weight accorded each. This pattern continued in use until 1944. Efforts were made by the Board to standardize the examining methods used in various parts of the country.

The practical portion of the examination was discontinued in the Fall of 1944. There were two main considerations. First, World War II caused serious staff shortages and restrictions in travel making an almost insurmountable problem for most pathologists and their staffs. Second, a study of the results of the "fail" rates revealed that the vast majority of those who failed the practical examination also failed the written one. From the standpoint of effectiveness, the practical examination added only one or two percentage points to the effectiveness of the written examination, which was far less then the probable error of the two methods.

At present, the Registry examination for medical technologists consists of 200 written multiple-choice questions covering hematology, microbiology, chemistry, immunohematology (which includes blood banking and serology), urinalysis, and histology.

Three types of questions are included on the examination: Level 1 - Recall -- Level 2 - Simple Interpretation -- Level 3 - Problem Solving and Evaluation. With the assistance of test experts and other specialists, the Board is working toward having the examination consist of 20% Level 1, 40% Level 2, and 40% Level 3.

To be eligible for the examination, a candidate must have completed at least three years of collegiate work (with specific course work in biological sciences and chemistry) and a one year course at an AMA-approved school of medical technology. In addition, a candidate with a baccalaureate (with the same science courses) and five years of acceptable clinical laboratory experience may take the examination.

Examinations are given semi-annually in about 170 centers throughout the country. The examination is graded on a curve, with the passing cutoff point set at one standard deviation below the mean, which results in about 16% failure.

Other examinations for generalists given by the Registry are:

Medical Laboratory Technician

This is the newest certifiable worker in the medical laboratory. The examination is a written multiple-choice test. It was given for the first time in November 1969, primarily to military training program graduates with the cooperation of the Office of the Surgeon General of the Department of Defense.

The educational program was the result of collaborative efforts by educators at the junior college level and laboratory professionals. In some respects this is still a developing program. One factor is the necessary review procedure and approval of the clinical training portion of the total program by the American Medical Association. Another is the need for possible refinement, based on experience, of the criteria for certification.

The principles of equivalency and the resulting need for equivalency testing mechanisms are built into the criteria for certification. These criteria are the work of professionals in the field: pathologists and medical technologists. Several routes can be taken to become certified, most of which involve having or acquiring an associate degree or its equivalent.

As noted in the Preface to this publication, work is currently being undertaken by the Federal government to develop equivalency and proficiency tests in four laboratory subject matter areas. These tests will primarily relate to and benefit the medical laboratory technician.

Certified Laboratory Assistant

A separate Committee on Certified Laboratory Assistants, working under the Board of Registry and the Board of Schools of Medical Technology, administers examinations once a year to candidates for laboratory assistant certification. This examination has been in existence since 1964.

Candidates must have a high school diploma and be graduates of an approved 12-month hospital-based school or graduates of an approved military medical laboratory course who have subsequently had a year of supervised laboratory experience.

Other certifying examinations for specialists offered by the Registry are:

Blood Banking

The certifying examination in blood banking, instituted in 1954, is a cooperative endeavor with the American Association of Blood Banks. To be admitted to an approved school in the field, a candidate must be a registered medical technologist, or have a baccalaureate with a major in any biological science, and one year of acceptable experience in a clinical laboratory. The training program for blood banking takes one full year, after which a candidate is eligible for the certifying examination.

The examination has both written and practical portions. A candidate must first pass the multiple-choice written examination. Within a year, he must pass the practical examination, which requires him to analyze blood samples sent to him by mail.

Beginning in 1970, those with at least five years of experience but without formal training in blood banking will be eligible to take the examination if they meet the requirements for admission to a school of blood banking. A master's degree in immunohematology may be substituted for two years of experience.

Chemistry

The certifying examination in chemistry has been offered since 1947. A candidate must have a baccalaureate with a major (or the equivalent) in chemistry, plus one year of experience in chemistry in an acceptable medical laboratory. A written multiple-choice examination includes questions on the chemistry of any part of the body, or body fluids, as well as instrumentation, chemical mathematics and nomenclature.

A certification examination in cytotechnology was established in 1957. A candidate is eligible to take the examination if he has completed two years of college with certain courses in biology and science, six months of training in an AMA-approved school of cytotechnology, and six months of acceptable experience.

A multiple-choice written examination is followed by a practical examination which consists of identifying projected 35mm. transparencies. The candidate should be familiar with standard textbook information and also with recent advances in the field of cytology.

Histologic Technic

Certification examination in histologic technic was established in 1947. A candidate is eligible to take the examination if he has a high school diploma plus one year of training and experience. A written multiple-choice examination must be passed followed by the practical portion requiring that the candidate submit certain slides by mail.

Microbiology

Certifying examinations were established in 1947. A candidate must have a bachelor's degree with a major (or the equivalent) in bacteriology, plus one year of experience in microbiology in an acceptable medical laboratory. A written, multiple-choice examination, it includes questions on bacteriology, serology, immunology, parasitology, and mycology.

Nuclear Medical Technology

This is a very new field with few training programs. Certifying examinations developed by the ASCP in cooperation with a number of organizations were established in 1964.

There are several routes to eligibility for the examination. A candidate may have one of the following combinations of education and experience in a clinical radioisotope laboratory: (1) ASCP registration as a medical technologist, plus one year of experience, (2) a B.S. in biology or chemistry or physical sciences plus two years of experience, (3) two years of college with courses in sciences plus four years of experience, or (4) high school diploma plus six years of experience.

The examination is aimed at on-the-job learning. It is a written, multiple-choice test, 50% of which is devoted to diagnostic procedures, statistics, and instrumentation.

Other Specialist Certification

Designed to recognize training and experience at a higher level than the baccalaureate, the Specialist certification is open to persons who have (1) a master's or doctorate in a specialty plus three years of experience in the specialty, or (2) a baccalaureate, certification as a registered medical technologist -- M.T.(ASCP) -- and five years of experience in a specialty.

This certification is available in the fields of hematology, microbiology, chemistry, and cytotechnology.

The Specialist examination is in three parts: an essay test, a multiple-choice objective test, and an oral interview. Candidates must pass the first two sections to become eligible for the oral examination. If the candidate fails any section, he must repeat the entire examination.

The Board of Registry is developing joint efforts with professional groups for cooperative programs in microbiology, clinical chemistry and others. Recognition for categorical specialists at all levels is being considered. Another aim is the establishment of international reciprocity of registries.

The American Academy of Microbiology Examinations

A number of certificates are available in the field of microbiology through agencies of the American Academy of Microbiology. Since January 1961, the National Registry of Microbiologists has offered examinations for Registered Microbiologists at the baccalaureate level, and for master's and doctoral degree Specialists in Public Health and Medical Laboratory Microbiology. The American Board of Medical Microbiology offers certification at the post-doctoral level in public health and medical laboratory microbiology and five separate specialty areas.

A candidate for Registered Microbiologist must have a baccalaureate with major specialization in a biological science and certain specified science courses. The Standards and Examinations Committee of the National Registry, however, may admit to examination persons who lack some of the course requirements.

The examination is designed to provide "concrete evidence that the candidate is familiar with the concepts, information, and factual knowledge appropriate to this field, "according to the Registry's announcement, "but it does not provide for appraisal of laboratory competence." The candidate may repeat all or any part of the examination any number of times.

The Specialist program, established in June 1969, is designed to recognize master's or doctoral level individuals who have a capacity to supervise the operation of the microbiological procedures in a public health or medical laboratory. As with the Registry program, the intent is to provide recognition for training and scientific understanding, but not an appraisal of laboratory competence. To be eligible, an individual must have a master's degree in microbiology or a master's or doctorate in medicine or science, plus at least four years of acceptable experience. The committee may waive some of the specific course requirements, but not the degrees. In case of failure the examination may be repeated an unspecified number of times.

Until June 30, 1974, an applicant may be registered as a Specialist without examination if he meets the requirements for admission to the examination. Also the master's or doctoral requirement will be waived until that date "for persons with established positions and eminence and who are members of the National Registry of Microbiologists with seven years or more of experience,...and are serving as a supervisor or its equivalent at the time of application."

To be eligible for certification as a Diplomate of the American Board of Microbiology, a candidate must have an earned doctoral degree and five years of acceptable post-doctoral training and experience. One year of teaching or independent research and one year of clinical internship or residency may be substituted for one year of experience.

In addition to the broad certification in public health and medical laboratory microbiology, certification is available in the specialties of bacteriology, immunology, mycology, parasitology and virology.

The examination has two parts. Part I tests a minimum knowledge level in each specialty considered to be necessary for anyone certified by the Board. Part II is a more advanced test in the candidate's area of competence. The examination may be repeated any number of times.

National Registry in Clinical Chemistry Examinations

A new organization, which conducted its first certification program in October 1969, the National Registry in Clinical Chemistry embraces the five major chemical organizations in the United States having a direct interest in the field of clinical chemistry. The American Association of Clinical Chemists, the American Board of Clinical

Chemistry, and the American Chemical Society, and American Institute of Chemists, and the American Society of Biological Chemists. The Registry grants accreditation at two levels: Clinical Chemistry Technologist and Clinical Chemist.

The Clinical Chemistry Technologist level is "designed primarily for applicants with recent bachelor's or master's degrees in chemistry or for those with academic degrees in other disciplines who regularly perform clinical chemistry determinations." To be eligible for the examination, a candidate must have a bachelor's degree in chemical science or a "closely related discipline," including at least 16 semester hours of chemistry, and at least one year of acceptable experience in clinical chemistry after the baccalaureate.

The Clinical Chemist category "exists for more experienced graduates who have majored in chemical science and who are active in the field of clinical chemistry." A baccalaureate with a minimum of 32 hours in chemistry and at least six years of subsequent experience are required. A master's degree may be substituted for two of the years of experience, and an earned doctorate for four.

Accreditation provisions include an interesting variation of the usual "grandfather clause." Until the end of 1970, candidates otherwise eligible need have had only 16 semester hours of chemistry if the number of years of experience in excess of six, when added to the number of semester hours in chemistry, totals at least 32.

The Registry's first certifying examination was prepared by the Professional Examination Service of the American Public Health Association. It is a three-hour, 150 item, multiple-choice written test designed to evaluate knowledge of both the fundamental and practical aspects of clinical chemistry. Its three principal parts are basic science, laboratory practice, and methodology. Candidates who fail may appeal to the Registry's Board of Directors within 60 days, or apply within one year for reexamination. Semiannual tests are planned.

The American Board of Clinical Chemistry offers a certification examination as a Diplomate. To become eligible to take the examination, a candidate must have: (1) a doctorate in the natural sciences or in medicine; (2) three years of acceptable education in chemistry including adequate graduate training in biochemistry; and (3) three years of adequate and acceptable experience in the practice of clinical chemistry. Examination for the didactic portion may be taken immediately following the successful fulfillment of qualifications for the earned doctoral; however, certification will be awarded only after appropriate clinical experience. If the candidate fails the examination, he may be reexamined once at the discretion of the Board without submitting a new application.

FEDERAL & STATE LICENSURE EXAMINATIONS

There is virtually no uniformity among the states in licensure requirements for personnel in the health occupations or for laboratories, though several influences are now at work to lesson the extremes of diversity. Some effects of several of these, including Medicare, are noted in the sections below.

State Personnel Licensure Examinations

Medicare regulations applicable to independent laboratories provide that each individual employed be currently licensed if there is a state licensing program for his occupation. They also provide that each State Department of Health, acting as an instrumentality of the Federal Government, is required to review and verify the qualifications of personnel in any independent laboratory which offers covered services. Moreover, the Medicare regulations lay down minimum acceptable requirements for qualification as medical technologist or technician, though the regulations exempt those who were employed before the law was adopted. (For qualifications see, "Independent Laboratory Director's Examination".)

Specifically, Medicare requires the completion by "technologists" of one of the following:

(1) a course of study leading to a bachelor's degree in medical technology; or

(2) three years of academic study and one of training in an AMA-approved school of medical technology; or

(3) a course of study meeting requirements for a B.S. in one of the chemical, physical or biological sciences, plus at least one year of pertinent laboratory experience and/or training; or

(4) three academic years including specified courses in chemistry and biology, plus at least one year of laboratory experience or training. (Either of the last two options must have provided education and

training in medical technology equivalent to that acquired under either of the first two.)

Medicare standards for "technicians" require high school graduation plus one of the following:

(1) completion of a one-year, AMA-approved technician training program; or

(2) two years of experience in an acceptable clinical laboratory; or

(3) a 50-weeks course in military medical laboratory procedures and service at the journeyman's level as a Medical Laboratory Specialist; or

(4) Certified Laboratory Assistant (CLA) certification by the American Society of Clinical Pathologists (ASCP).

Model State Laws

Other major influences tending toward more uniform standards for personnel licensure include model laws which have been formulated and recommended to the states by the Council of State Governments and the Center for Disease Control, which serves as the laboratory licensing agency for the Secretary of Health, Education, and Welfare (see page 16). Both model laws would authorize the State Department of Health to conduct "written, oral [and/or] practical examinations to determine the qualifications of clinical laboratory personnel for the purpose of licensure."

Nevertheless, as of March 1970 it appeared that only nine states, plus Puerto Rico and New York City, had licensure laws requiring examinations for laboratory directors or their subordinates. They were Alabama, California, Connecticut, Florida, Hawaii, Illinois, New Jersey, Pennsylvania and Tennessee. Examples of examination practices under some of these laws and regulations are given below.

New Jersey. The law authorizes written, oral and practical examinations for laboratory directors who are not State-licensed M.D.'s. Current tests, however, are all of the written essay variety. The tests have sections on (1) chemistry, (2) bacteriology and parasitology, (3) clinical pathology and serology, and (4) hematology. Candidates must take all four. A candidate who fails one section may retake that section; if he fails more than one, he must retake the entire battery.

New Jersey also licenses public health laboratory technicians on the basis of an optional examination in bacteriology, pathology or serology, Each, however, includes some general questions.

California. Licensed physicians and surgeons may direct clinical laboratories. Other laboratory directors are licensed as bioanalysts by the Board of Public Health if they meet specified educational and experience requirements and pass written, practical and oral examinations. About half of the candidates pass the written examination, which is prepared under contract by the Professional Examination Service of the American Public Health Association (APHA). Only 30% successfully complete all three phases and are licensed.

Clinical laboratory technologists are licensed, both as generalists and as specialists in microbiology, clinical chemistry or immunohematology if they meet educational and experience prerequisites and pass a written examination in all or one of these areas. They must have a baccalaureate, plus one year of on-the-job training in the field of the examination.

Hawaii. Examinations are available for laboratory directors and technicians (technologists). However, they are waived for a person of "good moral character" who has been similarly licensed by another State with similar standards, or who is ASCP-registered.

Pennsylvania. Individual laboratory workers are not licensed. However, a laboratory applying for licensure must employ personnel who meet State standards, and tests may be given to assure that standards are met. Such tests are waived for ASCP-registered medical technologists. Veterans who have had 50 weeks of military laboratory training are accepted at the technician level without examination. For those who must be tested, the Division of Laboratories of the Department of Health treats each case individually and devises tests appropriate for the candidate's education and experience.

Illinois. While it does not license individual clinical laboratory personnel, the State does require them to meet qualifications under the regulations for laboratory licensure.

> Laboratory directors without a M.D. or Ph. D. degree may be required to take a State-developed examination. Each one is individually prepared. It usually consists of short-answer, written questions. Such tests are also given technologists and technicians.
>
> The Illinois requirement for supervising technologist is a minimum of two years of college, including acceptable courses in chemical and biological science, a minimum of one year of supervised laboratory training and experience

in an AMA-approved institution, and two years of additional laboratory work. Experience may be substituted for the first three years in the ratio of two years of supervised working experience for each year of collegiate and laboratory training. One year of training and experience as an Armed Forces medical laboratory specialist may be substituted for the year of training in an AMA-approved program.

Tennessee. Examinations are required of non-doctoral laboratory directors, and of supervisors, technologists and technicians. Candidates are offered an option of taking an over-all examination at each level, or tests in any of five specialties. If they elect the latter, their resulting license is of course limited to the specialty or specialties examined.

Examination questions are developed by an advisory committee to the Department of Public Health. The tests are assembled by the Professional Examination Service of the APHA, which also provides the grading and statistical analyses. The tests are offered twice a year. About 25% fail. A candidate may take the test at one level three times; if he fails each time, he may then take the examination for the level below. There are no plans to offer oral or performance tests.

The Tennessee regulations are unusual in that they spell out the training for technologists and technicians in great detail. While the usual training for technicians is a full year of didactic and clinical work, the regulations offer an alternate route to eligibility for the licensing examination through training and service as a military medical laboratory specialist at the journeyman level.

Florida. Under a law which took effect in 1969, Florida licenses four levels: director, supervisor, technologist, and technician. For all but the technician, licensing in six specialties is offered. Some 4,500 existing employees were exempted under the new law, but every candidate for licensure must now take an examination.

The examinations, all written, were developed by the Professional Examination Service of the APHA. For the three upper levels, there are 50 questions on each specialty examination. Most candidates take more than one. Examinations for supervisors and directors include an additional 30-50 questions on administrative matters. The technician examination is one over-all unit containing 100 questions. There are no plans for oral or performance testing.

New York City. Certificates of qualification may be obtained without examination by laboratory personnel who have the required education and experience. Those who do not must take written, oral, and practical examinations.

> The written examination for laboratory directors, prepared by the Advisory Committee on Clinical Laboratories and Blood Banks, is an unusually comprehensive one which takes at least four hours to complete. It requires the exercise of judgment as well as recall of information.
>
> The director candidate who passes the written examination is eligible for the oral/practical, in which he is examined by three competent specialists in his own field. Two of the three must agree.
>
> For candidates on the lower levels in the laboratory, New York City uses the written examinations of the Professional Examination Service of the APHA, supplementing them with its own oral/practical tests. For laboratory supervisors, the oral/practical takes two hours and involves two examiners who must agree, or a third examiner is called in. For technologists and for technicians, one hour and one examiner apiece are required.

Independent Laboratory Director's Examination

Medicare regulations stipulate that directors of independent laboratories must have at least a relevant bachelor's degree or pass an examination sponsored by the U.S. Public Health Service. An independent laboratory is one which performs diagnostic tests, is independent of the hospital and of either attending or consulting physicians, and which otherwise meets criteria for participation under Medicare.

The director's examination was developed in 1966-67 by the American Public Health Association under contract to the U.S. Public Health Service, with the help of an advisory committee of nationally recognized authorities in the clinical laboratory field. It consists of a general section on laboratory administration, safety, ethics, quality control, etc., and specialty sections on microbiology, clinical chemistry, hematology, blood grouping and RH typing, and serology. The examination is specifically aimed at testing the candidate's understanding of procedures performed, as opposed to purely theoretical considerations. Its questions are all multiple-choice, primarily requiring recall of information, not exercise of judgment.

Any director who does not have a bachelor's degree in a laboratory science must pass not only the general section but also the specialty section covering any field in which the laboratory performs tests for which it does not have a Medicare-qualified supervisor. Similarly, in order to qualify in a new specialty, the laboratory must either have a qualified supervisor or the director must pass the examination for that specialty.

Recently, the examination has been offered each year. Candidates may take it up to three times, with no specific time lapse requirement. The tests have usually been administered by the State health departments, and occasionally by U.S. Public Health Service regional offices.

Laboratory "Proficiency Testing"

The use of "proficiency testing" programs, long available to medical laboratories as a means of assuring quality control, has become mandatory under Medicare provisions and Federal interstate licensing regulations administered by the Center for Disease Control (CDC).

Under the Clinical Laboratories Improvement Act of 1967, laboratories engaged in interstate commerce (with the exception of certain small laboratories) must be licensed by the Secretary of Health, Education, and Welfare through the CDC, unless they are accredited by the College of American Pathologists (CAP) and participate in its comprehensive proficiency testing program.

Except for CAP-accredited laboratories and those in certain States with testing programs of their own which are considered adequate, CDC maintains its own proficiency testing service to determine eligibility for Federal licensure.[1] The CDC has also assisted in developing guidelines for a performance evaluation program to assure the maintenance of quality in laboratories approved for coverage under Medicare. It aims to assure that all States with laboratories directed by persons whose academic qualifications are below the doctoral level will have adequate State-operated or approved proficiency testing programs covering the full range of clinical laboratory specialists.

In addition to the CAP, the American Association of Bioanalysts, a national organization of clinical laboratory owners, has a Proficiency Testing Service designed "to meet governmental agency requirements."

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[1] At the time this study was completed there were only two states that had their own testing program: New York (not including New York City) and Wisconsin.

Semiannual and quarterly surveys are provided, with tests in chemistry, hematology, blood banking, parasitology, and microbiology. Many States use one or the other of these services, while some require laboratories to use any one of a number of officially accepted programs and some have their own.

All these programs are designed to test the proficiency of the laboratory, not the individual laboratory worker. One part of the CAP program, however, is a special series designed as a teaching mechanism for residents and student technologists, which includes tests in the principal laboratory specialties.

Basically, the external programs for quality control testing involve the mailing or hand carrying of samples, which the laboratory is to process in its normal manner along with the day's regular work. The laboratory reports its findings, which are compared with results obtained by several reference laboratories and other participants. The results are graded by comparing them with the "correct" answers, and evaluations are returned to the laboratory.

The CAP offers: (1) a quarterly basic laboratory survey series, designed for small laboratories, which it says "more than meets the proficiency test requirements for Medicare"; and (2) a comprehensive series designed for large "sophisticated" laboratories, which "more than meets the proficiency test requirements for interstate licensure." The latter includes a series of tests in chemistry, one in hematology-clinical microscopy, one in blood banking, and a fourth in bacteriology-mycobacteriology-parasitology-serology.

PROFICIENCY/EQUIVALENCY EXAMINATIONS

This section includes a number of examples of the use of proficiency tests to provide a degree of upward mobility, as well as to determine placement in particular jobs. Where such tests open the door to advancement which otherwise would require additional academic attainment, they are, of course, a form of equivalency testing.

Federal and State Civil Service Examinations

Beyond the technician level, neither Federal nor State Civil Service regulations now provide for career mobility in the medical laboratory on the basis of testing. Nor are any equivalency procedures contemplated in recent proposals for greater uniformity.[2] These proposals assume that technician level personnel may do routine work under supervision, but that judgment is required for the professional level technologists -- judgment presumably formed on the basis of theoretical knowledge gained with a college degree.

Nonetheless, most laboratory directors who were queried in the course of this study knew of at least several cases in which special exceptions had been made to recognize and reward the ability of some individuals to increase their store of knowledge outside the classroom.

The only U.S. Civil Service testing of laboratory personnel is that of GS-2 and GS-3 Medical Laboratory Aides, who "must pass a written test of abilities necessary to learn and perform the duties of these positions," in other words, an aptitude or predictive test, not a test of knowledge or achievement.

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[2] "Guide Class Specifications for State Public Health Laboratories," prepared by the HEW Office of State Merit Systems, The Association of State and Territorial Public Health Laboratory Directors, and the Center for Disease Control; "Educational Qualifications of Public Health Laboratory Workers," prepared in 1966 by the Committee on Professional Education of the American Public Health Association and published in the March 1967 American Journal of Public Health.

Most of the State and local civil service regulations, on the other hand, do require at least written examinations of individuals seeking to work in State clinical laboratories. Nearly half the states operate their examination programs under contracts with the Professional Examination Service (PES) of the American Public Health Association (APHA), as do major cities and counties such as Berkeley, California; Baltimore City and Baltimore County, Maryland; Detroit and Wayne County in Michigan, and Philadelphia and Allegheny County, Pennsylvania. These are broad contracts covering the more than 25 fields in which PES provides tests.

PES examinations consist of multiple-choice written questions drawn from its large bank of test questions developed and reviewed by specialist consultants. They are practice oriented, "aimed at the real world," and not specifically related to academic courses or training programs.

According to PES, the employment examinations aim at identifying the best practitioners in any field, while licensing examinations, which they also prepare, are designed to eliminate the worst.

Examples of State Examinations

Illinois makes up its own civil service tests. Written examinations for laboratory technicians are supplemented by practical examinations designed by the State Department of Personnel to weed out candidates who in fact are unfamiliar with laboratory procedures even though they may understand them on paper. Previously, many had passed the written examination "who didn't know what the inside of a laboratory looked like."

The Illinois regulations now call for each candidate for Laboratory Technician I and II (Option I--Clinical) to take a written examination covering arithmetic, vocabulary, laboratory equipment, laboratory techniques, and clinical tests and procedures. He must then take a performance test, which "includes a practical demonstration in a State laboratory of the candidate's ability to perform specific laboratory tasks, and tests his knowledge of the equipment and techniques used..." Similar tests exist for Option 3 (Histological) and Option 8 (Bacteriological), as well as for other options not related to the laboratory.

California also devises its own examinations, including a series in the laboratory field. For most levels in the laboratory, tests consist of written and oral portions. Objective multiple-choice written tests are aimed at ability to apply principles and analyze data, as well as to recall information. Questions on supervision appear in tests for the higher levels.

A recent addition to California's testing program for laboratory personnel is a performance test for the Laboratory Assistant I level, developed in response to the needs of people who were having trouble with the verbal content of the former written test, which it replaces. The new test consists of three sections: (1) identifying laboratory equipment by matching items and name cards, (2) reading charts regarding the decontamination of equipment and (3) segregating laboratory items in two ways: first, distinguishing among items as to how they must be sterilized, and, second, distinguishing among usable glassware and that which may be damaged or dirty. Examiners are given thorough orientation, as they are for all performance tests developed by the California State Personnel Board, to provide for the maximum possible objectivity. Candidates who pass the performance test are also given an oral interview to evaluate personal qualifications. There are no plans to use performance testing for positions above this entry level.

California has a Mechanical and Technical Occupational Trainee classification particularly designed for the training of people who do not meet the formal entry level requirements. Completion of this training, or of any other formalized laboratory work experience and training program of at least three months duration, such as those conducted under Manpower Development and Training Act, Work Incentive Program, or similar work experience programs conducted by State Agencies" -- makes the trainee eligible for the new Laboratory Assistant I examination.

From the Assistant level, additional years of experience in State service make an employee eligible for advancement up to the Technician level, where formal education begins to be required.

U.S. Air Force Testing

The United States Air Force (USAF) has more than 500 tests, developed under policy guidelines laid down by the Personnel Standards Division, Directorate of Personnel Planning, Deputy Chief of Staff for Personnel, Headquarters, USAF. They are administered each year by test control officers at Air Force installations throughout the world. About 50 tests are offered in medical fields, including examinations for Medical Laboratory Specialist and Medical Laboratory Technician.

Until early 1969, these tests were used only to advance military laboratory personnel from one skill level to another within grade. They are now used also for promotions from Grade E-4 through E-7.

Most Medical Laboratory Specialists have taken the Air Force Basic medical laboratory course, although some personnel received their training on the job and are promoted to Specialist on the basis of experience. They may then take the advanced medical laboratory course, providing 14 weeks of didactic training and 9 months of clinical training. This course is desirable but not mandatory for the Medical Laboratory Technician level. Other specialties are Medical Laboratory Superintendent and Histopathology Technician.

Tests are open to those who qualify for grade promotions through length of service in the Air Force and in the specialty involved. All are scored by the percentile system; the higher the score, the more points the airman gets toward his weighted Airman Promotion System score. Those who are not promoted may take the test again the following year.

Each examination now consists of 115 multiple-choice items designed to test the application of principles in actual job situations. They were developed by Air Force senior noncommissioned officers working in medical laboratories, with the assistance of test psychologists.

The Air Force also offers career development courses by correspondence. Laboratory personnel who do not take the full medical laboratory course are required to take available correspondence courses at the same time they are developing on-the-job skills. New courses are being prepared in chemistry and urinalysis, microbiology, hematology, serology, blood banking and immunohematology, and medical laboratory administration. Evaluation portions of these courses are not yet fully developed.

U.S. ARMY TESTING

The U.S. Army Enlisted Evaluation System provides the basis for all personnel management decisions involving an Army enlisted man, including promotion, superior performance pay, and choice duty locations.

The tests are developed by the U.S. Army Enlisted Evaluation Center at Fort Benjamin Harrison in Indianapolis. Policy guidelines are established by the Classification and Evaluation Branch of the Enlisted Personnel Directorate of the Office of Personnel Operations, U.S. Army.

The evaluation tests are developed "to insure maximum coverage of your job requirements," according to the Test Aid put out by U.S. Army headquarters to list reference materials and courses for pretest study. Tests are given each year.

Pass/fail rates, expressed in percentages, not as an absolute passing score, are determined by consultation with the professional groups in related civilian fields. The medical specialties have the highest rates for failure, about 10-12%. A corpsman who fails is considered for reclassification to another specialty, and may be required to do additional study. Reclassification is mandatory for failure the following year. Anyone who fails evaluation tests three successive times, regardless of the specialties involved, must be considered for elimination from the service.

There are three skill levels for U.S. Army medical laboratory personnel, with a test for each: Medical Laboratory Assistant or Specialist, Senior Medical Laboratory Specialist, Chief Medical Laboratory Noncommissioned Officer. To take the Senior Specialist examination, a candidate must have completed successfully the Medical Laboratory Procedures (Advanced) course or be an ASCP-registered medical technologist.

Each of the tests contains 125 multiple-choice written questions. The U.S. Army has no performance tests in the medical field. Tests are designed to present problem situations such as those the individual would meet on the job. The Evaluation Center aims to avoid using test items which ask for isolated bits of information.

U.S. Navy Testing

Because U.S. Navy medical personnel may serve on small ships, far from comprehensive, well-staffed hospitals, each medical corpsman is trained to accept broad independent responsibility.

Graduates of the advanced medical laboratory course are no longer tested on the specifics of their particular Navy Enlisted Code as laboratory workers, but rather on a much broader range of information in the allied health fields. Advancement is based on these tests, in which all compete on the same level, regardless of specialty. Therefore, there are no proficiency tests in the medical laboratory field beyond those connected with the training course itself.

The advancement tests, given semiannually, are three-hour written examinations consisting of 150 multiple-choice questions. They include questions on first aid, pharmacy, mathematics, and such laboratory questions as any medical corpsman should be expected to answer. Questions on ward management and patient care are a major part of tests for the lower grades, and are gradually replaced by questions on administrative functions for higher-grade personnel. Some general military questions are included, as well.

Those who fail may be required to complete a correspondence course before taking the test again six months later, or may be expected to study on their own. Those who continue to fail on reexamination may have trouble reenlisting.

American Medical Technologists Proficiency Testing Program

In May 1969, the American Medical Technologists (AMT) announced its Educational Performance Proficiency Program, constructed by the Illinois Association of Clinical Laboratories (I.A.C.L., which in 1970 became a State section of the American Association of Bioanalysts, a national professional organization of independent clinical laboratory owners).

The Educational Performance Proficiency Testing Program was instituted, according to AMT officials, because existing programs did not encompass all laboratory personnel, and in the belief that good laboratory service depends on the ability of all to participate in a variety of programs of continuing education.

The program is designed for laboratory personnel who wish to participate voluntarily as individuals in the type of proficiency testing required for laboratories. It can also be used as a home study program for those who cannot attend continuing education seminars, and by those not currently employed in laboratories who wish to keep up to date. It employs a reference manual developed by the I.A.C.L.

Beginning in the fall of 1969, testing materials in hematology, microbiology, chemistry and cytology became available, designed for use by nonmembers as well as members.

Special Veterans Administration Tests for Medical Laboratory Technicians

A full battery of tests and ratings was given to medical technicians at Veterans' Administration hospitals in 1967 and 1968. It was part of a large study on test and job performance of black and white workers, undertaken jointly by the U.S. Civil Service Commission (CSC) and the Educational Testing Service (ETS) under a Ford Foundation grant. The study sought "to identify tests which are good predictors of job performance and at the same time do not place certain cultural subgroups at an unfair disadvantage." The medical technician's job was first to be studied.

Data were collected for 297 white technicians and 168 black technicians working in some 30 VA hospitals across the country. Each had been on the job at least two years; the median was eight to ten years. The data included scores on a battery of nine aptitude ("predictor") tests, a questionnaire giving background information, ratings by supervisors and co-workers, and scores on a test of job knowledge. A one-hour work sample test was begun but abandoned because of space and equipment shortages and other problems.

The rating scale was used as a criterion of job performance against which to measure the predictive test results.

The job knowledge test was assembled from items used in tests in a hospital medical technology school, reviewed and updated. Its 75 multiple-choice questions were aimed at testing recall of knowledge used on the job. It was used as a second criterion for comparison with the aptitude tests.

In an interim report on the study's results, ETS and CSC officials pointed out that the comparison of the job knowledge test with aptitude tests showed the opposite of what might be expected: comparison of the aptitude tests with the criterion measures (the job knowledge test and the ratings) did not show that paper and pencil tests are unfair to blacks.

ETS and CSC are analyzing the data further, and are expanding their study to other job positions. (See Bibliography)

Suggestions for Evaluation of Retrained Medical Technologists

In connection with a report on retraining medical technologists prepared in May 1967, consideration was given to the problems of evaluating retrainees. Although evaluation procedures were not included in a resulting set of "Curriculum Guides" because of wide variations in the backgrounds of potential retrainees, possible ways of testing medical laboratory personnel were discussed in some detail in the contract report.[3]

Three types of skills must be examined, according to the report: "retention of factual knowledge, laboratory proficiency in applying that knowledge, and laboratory discipline essential to maintenance of quality of technical skill."

Knowledge tests are best administered by the subject matter instructor, the report said. It went on to point out that there is no standard procedure for the evaluation of laboratory discipline, and that therefore, ratings by supervisors must continue to be subjective judgments.

On the matter of laboratory proficiency, however, the report went into more detail, and in fact drafted part of a "programmed test" in bacteriology as a sample of the type of testing which could be done.

The suggested test was adapted from procedures used by the National Board of Medical Examiners (see page 34).

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[3] "Curriculum Guides for Re-Training in Medical Technology", prepared by the National Committee for Careers in Medical Technology under contract with the U.S. Public Health Service.

TESTING PROGRAMS IN OTHER HEALTH FIELDS

While this section is not comprehensive, it provides a broad view. It offers evaluation of old testing methods and an account of the development of new ones from which other fields may have something to learn.

FLEX - FEDERATION LICENSING EXAMINATION

The Federation of State Medical Boards of the United States, Inc., provides a Federation Licensing Examination (FLEX) for use by State boards of medical examiners. It offers a reliable, uniform base for reciprocity among the states. Use of the examination is voluntary, but has steadily increased since it became available in 1968.

The examination is structured much like those of the National Board of Medical Examiners. Basic science, clinical science and clinical competence are covered in three days. Pretested items are drawn from the National Board's pool of multiple-choice questions, as well as from its films, photographs and programed testing questions.

Since the candidates include both practicing physicians and recent graduates, who must have been out of medical school at least one year, questions are selected in the range of medium difficulty.

Scores are given for individual subjects and for each day's examination as a whole. A "FLEX Weighted Average" for the overall battery of tests is computed by giving basic science the weight of 1; clinical science, 2; clinical competence, 3; acknowledging, according to the Federation, "the States' unique responsibility toward the remote graduate, the physician reexamined after withdrawal from practice for a number of years, and the foreign graduate."

EDUCATIONAL COUNCIL FOR FOREIGN MEDICAL GRADUATES (ECFMG)

The Council offers an examination program for certification of medical school graduates from outside the United States, Puerto Rico and Canada. ECFMG certification is required in two-thirds of the States and by certain American Medical Association and American Hospital Association regulations. Thus the examination represents a type of equivalency procedure, although the Council stipulates that it does not certify to knowledge equivalent to that of American medical school graduates.

The examination includes 360 questions, in English, drawn from the pool of standardized multiple-choice questions maintained by the National Board of Medical Examiners, each having been used in at least one National Board examination. They cover the fields of medicine, surgery, obstetrics and gynecology, pediatrics, and the basic medical sciences. The passing score of 75 is as nearly equivalent as possible to the passing score of 75 on the Part II National Board examination.

In addition to passing the examination, the candidate for ECFMG certification must present documentary evidence that he has completed the entire medical course in a foreign medical school. There is also an English test, "designed primarily to test the candidate's comprehension of spoken English."

CERTIFYING EXAMINATIONS FOR DENTAL ASSISTANTS

The Certifying Board of the American Dental Assistants Association (ADAA) has recently put most of its former performance examination into objective multiple-choice form.

Until the Fall of 1969, the dental assistant examination was in two parts: (1) a 2-hour written examination, followed by (2) a 3 1/2-hour practical clinical examination. The performance portion of the examination covered 14 items on which candidates were rated, including personal appearance, ability to identify and place tools, ability to prepare dental charts, typing and bookkeeping skills and procedures, processing and mounting of X-rays, identification and selection of armamentarium, and preparation of impression and filling materials. Six or seven examiners were needed for every 20 to 40 candidates. The observed clinical test has been eliminated, and most of the practical examination reduced to paper-and-pencil format. The new testing program was developed by the Board itself.

The 150-item written examination was increased to 200 items, incorporating most of the clinical problems through use of photographs and other means. Instruments, for example, are identified through pictures, rather than by actual handling, while a dental chart is filled out and questions about it answered in objective format.

To test manipulative skills, several practical problems remain as part of the test battery. Each has a product, however, which is evaluated centrally later, rather than by observation at local test centers. Each candidate must send to the Certifying Board of ADAA the evidence that he or she can expose, process and mount a series of X-rays, take an impression of a study model, make a stone cast, and construct a quadrant tray.

A major justification for the change was the fact that virtually everyone who had passed the written examination had also passed the clinical examination. The two tests were apparently measuring the same things, and at considerable expense in money and manpower. It was also felt that the practical test, as formerly administered, was not sufficiently objective in its evaluation.

High correlation between a practical examination and other methods used in selecting dentists for Regular Corps commissions in the U.S. Public Health Service was found in 1959 in a study by Sidney H. Newman and Margaret A. Howell of the U.S. Public Health Service and Norman Cliff of Educational Testing Service. Although the methods described are no longer used in selection of dentists for the Corps, the comparison of the various selection methods continues to be of interest.

The practical examination required each candidate to make an oral diagnosis and recommend therapy, to prepare and fill a cavity, and to construct a gold inlay in a synthetic model tooth. Ratings on the first two tasks were made independently by two dentist observers; the quality of the inlay was rated independently by a board of three dental officers in Washington.

Four objective 3-hour professional examinations were given each applicant, consisting of multiple-choice items constructed to measure professional judgment and reasoning as well as factual knowledge. An interview Board assessed the candidate's personal qualifications. Finally, an Evaluation Board assessed the applicant's training, experience, and work record.

In the 1959 study, the practical examination was used as the criterion of the dentist's clinical ability. Results were compared with those derived from other selection methods to determine whether they measured the same qualities. It was found that they did.

The possible significance of their findings was pointed out by the authors:

"In situations where practical examinations are not feasible as a part of the selection battery, this study suggests that other methods of assessment and evaluation such as the ones used here may be fairly satisfactory substitutes in that they may be expected to be quite highly correlated with performance on a practical examination."

NATIONAL BOARD OF MEDICAL EXAMINERS EXAMINATIONS

Examinations of the National Board of Medical Examiners are divided into three parts; I, the preclinical sciences; II, the clinical sciences; and III, clinical competence. Parts I and II are designed for undergraduate medical students, Part III for the post-intern student.

The first two parts consist of multiple-choice questions, and, according to officials of the Board, have "been well established as highly reliable tests of medical knowledge and a candidate's ability to apply his knowledge to the problem in hand."[1]

Until 1961, the clinical competence evaluation, Part III, consisted of an oral examination given at the bedsides of assigned patients, with examiners looking on. To eliminate the problems presented by the patient and the examiner as variables, the National Board devised a new Part III examination designed "to obtain a reliable measurement of the third variable, the candidate."

Since the candidate has not only completed medical school but also his internship when he takes this portion of the test, the aim is to test not only didactic learning but also its application in practice.

With the help of the American Institute for Research, a realistic definition of clinical competence was obtained by the "critical incident technique" developed by Dr. John C. Flanagan. (See Bibliography) An examination was developed which, since 1961, has included three sections:

The first section consists of a series of motion pictures, each showing the clinical features of a patient being examined, as a physician might see them. The task of the candidate is to recognize and to interpret what he is shown. He does this by responding to a set of multiple-choice written questions based on his observations. Additional information may be given, after which other questions call for a more definitive diagnosis.

The second section "consists of standard multiple-choice questions related to pictures of patients or specific lesions, or gross or microscopic specimens. This section may also include questions related to the interpretation of radiographs, electrocardiograms, funduscopic views, blood smears, or other clinical material that can be shown pictorially, or graphically, with the use of color reproduction when color is needed." [2] These are printed pictures, which the Board officials feel have many advantages over slides, in that they are continuously available to the candidate, and can be shown as a group, requiring discrimination rather than simple identification.

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[1] Hubbard, John P., Levit, Edith J., Schumacher, Charles F., and Schnabel, Truman G., Jr., "An Objective Evaluation of Clinical Competence," New England Journal of Medicine, June 24, 1965, page 1321.

The third section, which the Board calls "programmed testing," is designed to deal with a physician's ability to identify, to resolve and to manage the problems of patients. The candidate is confronted with limited information about a sick or injured patient, and must decide what action to take. From a list of procedures, he chooses those he would follow. For each there is feedback, since in making his decision he erases a special ink block in the test answer booklet, under which are revealed the results of that decision, or the new information he has called for. Following this process through several sets of possible choices for action, he continues until the patient improves or perhaps dies. Thus, this is a step-by-step progression through a sequence of problems, each building on the information gained before. Such a test is scored by giving credit for correct choices of action (as shown by erasures in the answer booklet), and penalties for wrong choices made or for right choices not made.

The new Part III is considered both reliable and valid.

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[2] Ibid

With little or no uniformity in standards, methods or procedures, educational institutions and public agenices have made sporadic efforts to grant credit or advanced placement in recognition of previous training and experience acquired by nurses.

The problem is acute for Licensed Practical Nurses (LPNs) entering diploma schools or associate degree programs to become Registered Nurses (RNs) and for RNs returning for the baccalaureate. As early as 1945, the National League for Nursing Education (NLN) called on "educational institutions to explore further mechanisms which will make it possible for nurses to demonstrate previously acquired knowledge and competence in order to avoid unnecessary repetition of nursing content."

A variety of "challenge examinations" have been used by nursing schools to allow credit for past training and experience. Many of these have been socially constructed tests, a practice that is subject to criticism on many grounds.

In 1969, all directors of baccalaureate programs, responding to a questionnaire from the NLN Measurement and Evaluation Services, indicated that they admit RNs, granting them either credit or advanced placement on the basis of various proficiency tests. Few if any of the tests, however, appeared to have been designed for the purpose; they ranged from the College Level Examination Program tests in liberal arts to locally devised nursing evaluations.

Perhaps the most carefully planned effort is one now under way at Hunter College. It is a work-study project for upgrading practical nurses to become registered nurses. It is supported by a U.S. Public Health Service grant with the cooperation of the New York City Health Services Administration and Department of Personnel.

Nurses admitted to the program have received "appropriate recognition of skills already mastered," as evaluated by practical nursing examinations developed by the Psychological Corporation. Credit is given toward the usual "Fundamentals of Nursing" course. Competition was keen for admittance to the first group in 1969--for 25 places, 600 LPNs working in the Department of Hospitals took the test. An English proficiency examination was required as well, along with satisfactory grades in practical nurse school and evaluation records from the Department of Hospitals.

Each student undertakes a 17-month trimester program which will provide some 1,500 classroom and laboratory hours of study, while working four hours a day with payment at the full-time rate.

The three and one-half year project calls for 75 LPNs to have this experience. Each will be qualified to take the State examination for registration as a professional nurse, will receive six academic credits, and will be eligible to receive 36 nursing credits upon completion of the appropriate proficiency examination administered by Hunter College.

Still another important new departure is an examination program for nurses now being offered by the College Proficiency Examination Program (CPEP) in New York. This program of five tests is being used to grant credit. (See pg. 47)

A program called the Orthopaedic Training Study began in 1964 to develop evaluation instruments which would assess competence in orthopaedics. It was a joint project of the American Board of Orthopaedic Surgery and the Center for the Study of Medical Education of the University of Illinois College of Medicine and was funded under a contract with the U.S. Public Health Service, Bureau of Health Professions Education and Manpower Training.

Many possible testing techniques were studied; three new ones evolved from the project, all having substantial reliability and validity.

> The Simulated Patient Management Problem is a written test developed separately but along the same lines as the National Medical Board's Part III (See page 34). It is a "programmed" test situation in which the candidate builds one decision on another in diagnosing and treating an imaginary patient.
>
> The Simulated Diagnostic Interview is an oral test in which the examiner plays the role of the patient and the candidate elicits information from him. After 12 minutes, the candidate is given three minutes to present his diagnostic impressions.
>
> The Simulated Proposed Treatment Interview is an oral test in which the examiner again plays the role of a patient. The candidate has three minutes to familiarize himself with the case, after which he must explain the treatment to the "patient." This test is aimed at evaluating effectiveness of physician-patient relationships.

The study also analyzed three traditional methods of evaluation:

> The Multiple-Choice Examination, a traditional form of testing orghopaedic residents, which on analysis was revealed to be assessing mainly recall of information.
>
> The Oral Quizzes, given to candidates for certification for many years. They were five half-hour quizzes for each candidate, administered by large numbers of practicing orthopaedists. On analysis, they also proved to be assessing recall and recognition of isolated fragments of information.

The Supervisory Rating Form, a new form designed to minimize the subjectivity of such appraisals by introducing specific criteria to guide observers in making their judgments.

Correlations among all these methods indicate that each of the test variables measures important areas of competence not measured by other tests. The study is continuing to assess the new evaluation methods, as they are introduced into the Board's certification examination. In cooperation with the In-Training Examination Committee of the American Academy of Orthopaedic Surgeons, these methods are being used to study the rate at which some of the measured elements of competence are achieved by residents at various levels of training. This may lead to changes in residency programs.

PHYSICAL THERAPISTS CERTIFICATION EXAMINATION

A test to qualify State-licensed physical therapists for full participation in the Medicare program is being developed under sponsorship of the Division of Health Standards of the Community Health Service, U.S. Public Health Service.

The examination is designed to evaluate the knowledge and skill of licensed physical therapists who lack the formal educational requirements specified in Medicare's conditions of participation for providers of care.

The examination is being developed, under contract, by Cybern-Education, Inc., and is expected to be ready for administration by late 1970. On the advice of test experts and in the light of much experience reflected in this publication, it will consist of multiple-choice questions.

PHYSICAL THERAPY ASSISTANTS EXAMINATION

A proficiency examination for physical therapy assistants is under development. It is sponsored by the Bureau of Health Professions Education and Manpower Training of the National Institutes of Health and is being developed under contract with the Professional Examination Service of the American Public Health Association, in cooperation with the American Physical Therapy Association and the active assistance of an advisory committee.

In designing an examination to determine the proficiency of physical therapy assistants, it has been necessary to: 1) define the role and duties of the worker, 2) determine the knowledge and skills needed for competent practice in the job, and 3) design an appropriate examination to test that knowledge and the necessary skills. The examination will be a written one.

Its design will be especially suitable for a graduate of an associate-degree level educational program, but may be taken by other persons qualified through experience or education since it is job-oriented rather than education-oriented. It may also prove useful as guidance to State licensing boards.

It is hoped that the test will be available for use by December 1970.

TESTING PROGRAMS IN OTHER FIELDS

This section draws together most of the basic experience from other fields which is required as essential background for those concerned with problems of equivalency and proficiency testing for the health occupations.

Several sub-sections deal specifically with equivalency testing, giving some of the few examples where this had become established practice.

U.S. CIVIL SERVICE COMMISSION EXAMINATIONS

The U.S. Civil Service Commission (CSC) has only two equivalency examinations: library science and accounting. Experience appears to have been mixed.

The library science examination opens the way for those who pass it to become Civil Service librarians without completing the usual academic and/or experience requirements. Success in the accounting examinations permits those in jobs at the technician level to move up to professional positions without the usual four years of college and the Certified Public Accountant (CPA) examination. It is used chiefly for in-service promotions.

CSC experience indicates that the accounting examination achieves its purpose, though difficulties have been encountered in keeping it abreast of new developments. There seems to be ample evidence also that a librarian's knowledge and skill can be acquired without a college degree, but experience with the particular examination being used has not been entirely satisfactory. It attempts to assess in half a day what should have required four years of study to learn. The passing rate is only 20%.

In other occupations, including health, the CSC system is one based on equating experience (measured chiefly by time served) with education. In some professional fields, of course, there are specific educational requirements. For most other posts, education at different levels can be substituted for prescribed amounts of experience, although the reverse is not true.

CREDIT-BY-EXAMINATION PROGRAMS OF COLLEGES AND UNIVERSITIES

Since 1895, the University of Illinois has granted credit to students who passed special departmental examinations.

Of 300 North Central colleges and universities answering a 1959 questionnaire on the subject, 171 granted college credit by examination. In 105 of these institutions, all departments could or did participate. Another 45 limited the practice to specific departments. Some placed a limit on the amount of credit that could be earned; most students earned less than 15 hours. In his report on the survey, J. A. Hedrick indicated that faculty acceptance of the concept of credit by examination was increasing.

While no survey has been done recently, there is no doubt that the practice of granting credit by examination has continued to grow. The trend has accelerated with the availability of the College Level Examination Program (CLEP) of the College Entrance Examination Board (CEEB).

Some institutions have carefully thought out policies and programs of credit by examination, making use of CLEP and New York's College Proficiency Examination Program (CPEP) tests as well as local tests devised by teachers of various courses. A few examples:

Syracuse University offers credit by all of these methods for fully matriculated students, up to a maximum of 30 semester hours, and offers advanced standing through examinations as well. Its University College Directed Self-Study Program gives credit for what a student already knows if it is relevant to the content of the program; he may skip to a higher level and avoid loss of time in restudying such areas.

Boston University's descriptive brochure, "College Credit by Examination," details the ways of obtaining credit through CLEP and other CEEB tests and through the University's own subject examinations in a number of courses.

Cornell University's College of Agriculture, on the other hand, which formerly had a well-developed local testing-for-credit program, now relies on the CLEP and CPEP tests almost exclusively.

The Advanced Standing Program at Louisiana State University (LSU) offers up to 30 hours of credit by examination--CLEP exams and LSU departmental exams.

The Brooklyn College Special Baccalaureate Degree Program for Adults has special tutorial seminars for mature adults with "a background of liberal life experience," some of whom may be exempted with credit on the basis of examinations.

Beaver College gives its departments discretion whether to use locally constructed or standardized tests in each case where an individual seeks credit, and whether to give credit or advanced standing. There is no limit to the number of course credits available by examination.

Placement tests are used by the Bachelor of Liberal Studies Program (BLS) at the University of Oklahoma to guide applicants for admission to this independent study program. "A few adults with unusually rich experience and prior learning may complete the BLS in two years or less."

NEW YORK COLLEGE PROFICIENCY EXAMINATION PROGRAM (CPEP)

The New York State Education Department established its College Proficiency Examination Program (CPEP) in 1962, "In an effort to open up the educational opportunities of the State to individuals who have acquired college-level knowledge in ways other than through regular classroom attendance."

With the guidance of nearly 200 college faculty members who serve as consultants, the program has produced more than 30 examinations which can be used to evaluate an individual's off-campus learning. Most of these tests are in first- and second-year college courses. Sciences in which tests have been developed are biology, chemistry, earth science, geology, and physics.

A majority of New York institutions, and some others outside of the State, are accepting credit under the program though regulations vary considerably. At least one institution allows 66 credit hours; most have lower limits. Test results are also accepted by the State Education Department to meet some of the specific requirements for teacher certification. Some grant credit only provisionally until the student has been on campus for a certain period. Some require payment of fees for the granted credits; others do not.

According to CPEP's announcement of its testing program, the examinations "are reasonably difficult and demanding examinations, as they must be, in order for colleges to recognize successful performance on them for credit. It should be remembered that college professors have regular contact with on-campus students and have many opportunities to gain an accurate sense of each student's capabilities. The applicant for credit by examination is evaluated just once through the examination. It is logical, then, that the person seeking credit by examination should be prepared to perform somewhat above the minimum expected for the on-campus student."

Program for Nurses

In 1968, the New York program offered for the first time three examinations in the nursing field, designed to offer credit for the registered nurse who is returning to school for a baccalaureate. The following year, a "Fundamentals of Nursing" test was offered for the licensed practical nurse entering a Registered Nurse Program (RN) and wishing to get credit for her Licensed Practical Nurse (LPN) training and experience. A fifth examination, an associate degree "Maternal and Child Nursing" test, was ready for administration in January 1970.

Each of these tests was developed under specifications laid down by a six-member faculty committee of nursing educators. Each uses 150 multiple-choice questions. Norms are developed by giving the tests to students actually completing each course.

The CPEP nursing examinations are gradually gaining acceptance by the baccalaureate and associate degree nursing programs in New York. A recent tally indicates that at least 12 of the State's 28 baccalaureate nursing programs are granting credit, while only one has officially declined to do so. Twenty of 32 associate degree programs will grant credit. At least six baccalaureate programs grant blocks of credit for all three baccalaureate examinations, ranging from six to 30 credits. The State University of New York at Buffalo grants 32 credits for the four nursing examinations so far in use.

THE COLLEGE-LEVEL EXAMINATION PROGRAM

In 1965, the College Entrance Examination Board (CEEB), which has for years offered entrance and advanced placement examinations for use by colleges and universities, established its College-Level Examination Program (CLEP) "to enable individuals who have acquired their education in nontraditional ways to demonstrate their academic achievement." It provides on a national basis the same sort of testing program originated by New York State. (See page 47.)

The examinations offered by CLEP are of two types: a battery of five General Examinations, which measure general educational background of students who have had one or two years of college instruction or its equivalent, and a series of Subject Examinations, each covering one academic course. There are no prerequisites for a candidate who wishes to take any of these examinations.

Some 450 colleges have indicated to CLEP that they will award credit on the basis of these examinations. The list is growing rapidly. As is true with the New York State Program, colleges use the examinations in many different ways. Minimum acceptance scores vary, as do the amounts of credit which will be granted for any one examination, the maximum amount of credit allowable, and other attendant regulations.

In addition to their use for credit for off-campus learning, the examinations are serving to help in assessment of transfer applicants, to allow a junior college to compare its graduating sophomores with national norms, to provide information for educational counselling of students, to recognize the continued growth and development of individuals in the military service, and to assist in the evaluation and placement of foreign students.

Organizations and agencies other than colleges and universities have used the General Examinations as a measure of college equivalency for certification or promotion purposes. For example: a State board of bar examiners requires them of all applicants for the bar exam who do not have the equivalence of two years of college education for the purpose of certification as a librarian; a quasi-governmental agency has used them to meet a promotion requirement, as has at least one company. Of course, this use of the examinations for professional or employment purposes does not provide any academic credit for the individual.

The examinations are developed by Educational Testing Service (ETS), making use of examining committees composed of faculty members and representatives of business, industry, and certification or licensing agencies as appropriate.

Each of the five General Examinations contains about 100 multiple-choice questions. The English Composition test is an hour long; 75 minutes are allowed for those in humanities, mathematics, natural sciences and social studies.

Subject Examinations are currently available in 21 widely taught undergraduate courses. Each relates directly to the course content as would a final examination. CLEP intends to develop more than 100 such examinations. Those now available in the sciences are general chemistry and geology, and a biology test is under development. Each consists of a 90-minute multiple-choice test of approximately 100 questions.

A candidate may repeat General Examinations once within a year; with special permission, but may not repeat a Subject Examination for a period of one year.

TESTS OF GENERAL EDUCATION DEVELOPMENT (GED)

The best known and most widely used equivalency tests are the Tests of General Educational Development (GED), sponsored by the American Council of Education, Commission on Accreditation of Service Experiences (CASE) and administered by the State departments of education.

This program was established at the end of World War II to provide a way for veterans to obtain the high school diploma required for admission to college. For 20 years, it has continued to prove useful not only to veterans but to many other adults. The Armed Forces also accept satisfactory test scores for assignment to service schools or for promotion when high school equivalency is required.

The GED test battery consists of five comprehensive examinations in English, social studies, natural sciences, literature, and mathematics. Each test takes approximately two hours, although no time limits are set. According to a CASE publication:

> "The GED Tests have been designed to measure as directly as possible the attainment of some of the major objectives of the secondary school program of general education. The emphasis is on intellectual power rather than detailed content; on demonstration of competence in using major generalizations, concepts, and ideas; and on ability to comprehend exactly, evaluate critically, and to think clearly about concepts and ideas."

Civilians, including veterans, take the GED tests at centers designated by State departments of education, and at VA hospitals and Federal correctional and health institutions. Military forms of the tests are administered to personnel on active duty through the United States Armed Forces Institute (USAFI), at USAFI testing sections.

Each State department of education sets its own standards for use of the test results. CASE recommends that States set the passing score at the level at which approximately 20 per cent of their in-school seniors would fail.

ENGINEERING TECHNICIANS EXAMINATIONS

In 1961, the National Society of Professional Engineers established its institute for the Certification of Engineering Technicians, in order to raise performance standards of engineering technicians and determine their competence through investigations and examinations.

The Institute certifies technicians in three grades:

1. Junior Engineering Technician requires two years of experience or graduation from an accredited two-year program in engineering technology.

2. Engineering Technician requires five additional years of experience. The applicant must be at least 25 years old, and may be required to pass an examination (which is waived for graduates of the accredited schools).

3. Senior Engineering Technician requires another ten years of experience. No examination is required, because too many specialties are possible.

The Institute's certification program provides recognition, status, and the incentive for further study and more extensive work experience.

The Engineering Technician examination was developed with the help of an advisory council and was tested in schools and industries. It is set at the level expected of a graduate of a two-year technical institute. Several hundred candidates have taken it since it was first offered.

TRADE AND INDUSTRIAL EDUCATION TEACHERS COMPETENCY EXAMINATIONS

"Occupational competency testing" is the name being given in the trade and industrial education field to the evaluation of technical skills possessed by prospective teachers in industrial or technical vocational education programs.

As these education programs expand, it becomes increasingly difficult to find competent teachers. Most of the States have sought individually to deal with the problem of screening candidates. A "Consortium" research project, now under way, is designed to provide a national approach to the problem. It is funded by the Bureau of Research of the U.S. Office of Education, with a grant to the Graduate School of Education of Rutgers University, which has set up the National Occupational Competency Testing Project.

The Project resulted from a 1966 meeting of representatives from 23 States. It was agreed that States need help in developing such tests and that a national effort would reduce duplication, achieve economies, produce more reliable tests, upgrade the vocational teaching profession, and still allow for flexibility.

The Project will survey the "state of the art" of occupational competency testing and prepare a handbook for the development of tests. It will develop pilot competency tests, establish their reliability and validity, and develop scoring, interpretive materials and guidelines for their use. Finally, it will "put into operation a feasible program of occupational competency testing under a Consortium of States arrangement."

Some colleges and universities offer academic credit for trade or industrial experience. Iowa State University, for example, gives up to 30 semester hours of credit for a written, performance, and oral examination in the individual's technical field. At the University of Tennessee, up to 27 quarter hours may be earned through examinations in technical areas developed by the Department of Industrial Education.

OTHER PROCEDURES

This is a miscellaneous section consisting of items which, though unrelated, are of exceptional interest to all concerned with the problems of equivalency and proficiency testing.

THE COMMISSION ON ACCREDITATION OF SERVICE EXPERIENCES

The Commission on Accreditation of Service Experiences of the American Council on Education was set up immediately following World War II, to review military service courses and make recommendations as to how many credits college and university admissions offices might give to graduates of these courses. Its recommendations are purely advisory.

The Commission also sponsors the General Educational Development Testing Program. (See page 51.)

Commission recommendations are made with the help of expert consultants in the field who assess the course materials and make independent judgments which are compiled by the Commission. The credit suggestions are published in the Commission's Guide to the Evaluation of Educational Experiences in the Armed Services. Changes following publication of the Guide are available to colleges and universities from the Commission's advisory service.

Consultants base their recommendations for credit on those phases of the training which have counterparts in civilian education. "Credit recommendations are made only for those training programs in which there is an adequate demonstration of academic achievement by those who complete the courses," according to a Commission announcement. The Commission does not evaluate on-the-job training or service extension courses.

In the case of medical corpsmen wishing to enter the civilian health fields, however, most colleges have been reluctant to give credit without further verification of what has been learned. In practice, corpsmen returning to civilian life find themselves able to attain only the first rung of the career ladder in the laboratory - a ranking equivalent to the Certified Laboratory Assistant (CLA)[1], whose background is one year of hospital-based training. Without two years of college training they are unable to be considered for advancement beyond the CLA level.

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[1] For further information on problems of returning corpsmen, see Bibliography, including reference under Young, Colonel James J.

PRACTICES OF ALLIED HEALTH SCHOOLS IN GRANTING CREDIT BY EXAMINATION

At the November 1969 meeting of the Association of Schools of Allied Health Professions, both its Council on Baccalaureate and Higher Degree Programs and its Council on Associated Degree and Certificate Programs indicated that equivalency and career mobility would be a major program emphasis of their newly formed organizations.

Some institutions have begun to facilitate the entry of experienced students into their programs by offering certain amounts of credit. Although it was not possible to make a systematic sampling, the examples which follow indicate the direction of plans and programs in this field.

At the School of Allied Health Sciences of the University of Texas, Galveston Medical Branch, officials visualize the assistant or technical level educational program as part of the professional course of study. They are therefore enabling two-year associate degree graduates to become accepted by the professional schools with only a minimum loss of time or credit. While they may be required to take additional work in advanced basic sciences, they do not have to repeat elementary sciences already mastered.

Cuyahoga Community College in Cleveland allows students entering its new associate degree Medical Laboratory Technician program 19 credits for successful completion of the course material in its one-year Certified Laboratory Assistant program.

Miami-Dade Junior College in Florida is in the process of instituting a credit-by-examination program which will ultimately be extended to all courses on the campus, and under which students could earn 45 credits in a 60-credit program. Students in the Division of Allied Health Studies who are licensed or certified in their particular fields are given credit for all the technical courses, provided they take one laboratory course in their field at the college.

C. W. Post College of Long Island University grants credit for the year of training, as well as for applicable academic courses, to registered medical technologists enrolling in its Program in Medical Biology.

St. Petersburg Junior College in Florida has a four semester credit core course entitled "Survey of Health Related Fields," for which equivalency tests were given in 1970. There are also equivalency tests for basic nursing, basic physical therapy, and beginning laboratory skill development courses. In developing the new medical laboratory technician program, the College will attempt to help students take examinations, with the idea that those who are knowledgeable, safe for patient care, and secure in their background material should be able to move on more rapidly within the framework of the proposed course of study.

The Program in Respiratory Therapy at Northeastern University in Boston has a newly developed series of examinations tied into a career ladder in the field of inhalation therapy. Up to 31 credits toward the 93 required for the three-year cooperative associate degree are obtainable by a candidate who can pass the battery of examinations in inhalation therapy. The way is open also for him to obtain the other necessary credits in applied sciences and liberal arts through the CLEP tests, so that theoretically, at least, he may achieve an associate degree from Northeastern by examination. The examinations evaluate knowledge and skills gained by nontraditional means, certifying present competence irrespective of the route traveled to attain it.

A junior college in the Southwest proposes to give military medical corpsmen blocks of credit toward the associate nursing degree, based on a comprehensive equivalency examination still to be developed, covering many small blocks of knowledge and skills. A candidate would have his program individually tailored for him depending on the results of his examination, and would have to take only that training in which he is deficient. The college views this as a possible model for the development of equivalency tests in other health occupations.

Officials at a number of institutions have indicated they are considering or working on the problems involved in granting credit for work experience in the health field. These include the Hunter College Institute of Occupations Education at the University of Iowa, the School of Allied Medical Professions of Ohio State University, the School of Allied Health Professions of the State University of New York at Stonybrook, the Health Careers Program of Albert Einstein College of Medicine of Yeshiva University and others.

LABORATORY PERSONNEL PROCEDURES IN CANADA, GREAT BRITAIN AND SWEDEN

For the purposes of this study only a limited effort was made to obtain information on laboratory personnel procedures in foreign countries. Results are summarized below.

There is no national or provincial licensing of laboratory personnel in CANADA. The Canadian Society of Laboratory Technologists (CSLT) is the only certifying body. It presently offers certification at the following levels: (1) Laboratory Assistant, (2) Registered Technologist, (RT) General, (3) Registered Technologist, Subject, which requires passing a more difficult examination in one or more of seven disciplines, (4) Advanced Registered Technologist (ART) in one or more of seven subjects, (5) Licentiate (LCSLT), and (6) Fellowship, by nomination. Some 1,000 candidates take the CSLT examinations each year.

Training programs are largely in cooperative schools, conducted by groups of hospitals in various cities. There are a few institutes whose programs include not only medical technology but also other paramedical programs. There are also two degree courses connected with provincial universities. No credit-by-examination arrangements are in operation.

In GREAT BRITAIN, the terms technologist and technician are used interchangeably. The standards are uniform throughout the British Isles for those employed in laboratories which fall within the National Health Service. The system amounts to a clearly delineated career ladder. Information about it was furnished by W. H. Valentine, O.B.E.

The beginning rung is for the Student Medical Laboratory Technician, who receives three years of training and experience in the laboratory, circulating through the various specialties. Success in the intermediate examination of the Institute of Medical Laboratory Technology (IMLT) enables him to become a Junior Medical Laboratory Technician, who specializes in one of the disciplines for two years. He may then take the "final" examination of the IMLT in that discipline. Success on that test entitles him to Associateship in the IMLT and to automatic promotion to the basic grade, Medical Laboratory Technician. Both the intermediate examination and the associate examination are in three parts, written, oral and practical.

The four grades above the basic one: (Senior I, Senior II, Chief I and Chief II) are open to those who have obtained Fellowship of the IMLT by further written and oral examination two years after the associateship examination.

A recent development, according to Mr. Valentine, that is gradually making changes in the training up to the basic grade has been a collaborative effort of the IMLT and the Department of Education and Science "in producing special variants of the Ordinary and Higher National Certificates in Sciences." He continues:

"These are long-established nationally recognized diplomas, each requiring two years of study, and the new variants are orientated to medical laboratory practice. Their educational content ensures a good foundation in chemistry, physics and mathematics. To attend these courses, students and juniors are given day release or "block" release from their laboratories. This newer system will, over the next two or three years, entirely replace the intermediate and qualifying examinations of the IMLT but will not affect the need for technicians to go on to fellowship level if they are to progress to the more senior positions."

"Among the advantages of the National Certificate scheme is that the holder of a High National Certificate may utilize it, if he is ambitious, as a means of proceeding with further study, to a science degree or equivalent. He could then migrate to the 'scien[illegible]' category either inside or outside of the National Health Service."

In SWEDEN, public health officials are "very interested in facilitating the upward mobility of health personnel," according to Majsa Andredd of the Swedish National Board of Health and Welfare, who goes on to say:

"It is a general trend in our present educational program to make it possible for people with a certain education to get a shortened higher education by getting credits for knowledge already obtained. Within the health field this is put into system specifically within the field of nursing. We can however so far give no examples from the laboratory field."

BIBLIOGRAPHY

Every effort has been made to include in this Bibliography a sufficiently broad selection of references, each with a brief annotation, to meet the needs of all with a practical interest in the field. The researcher, of course, may wish to look further. References have been grouped under major subject matter headings.

HEALTH MANPOWER AND CAREER MOBILITY

MOBILITY AND TESTING IN THE MEDICAL LABORATORY FIELD

TESTING IN HEALTH PROFESSIONS

TESTING NURSES

GRANTING ACADEMIC CREDIT BY EXAMINATION

TRANSFER FROM MILITARY TO CIVILIAN HEALTH FIELDS

LICENSURE AND OTHER GOVERNMENTAL REGULATIONS

TESTING IN EDUCATION AND INDUSTRIAL FIELDS

TESTING -- GENERAL REFERENCES

HEALTH MANPOWER AND CAREER MOBILITY

1. Hapgood, David, "Diplomaism: How We Zone People," "The Health Professionals: Cure or Cause of the Health Crisis," and "Degrees: The Case for Abolition," Washington Monthly, Vol. 1, Nos. 4, 5 and 7, 1969. Halberstam, Michael J., M.D., "Doctors and Diplomaism," Washington Monthly, letter to the editor, Vol. 1, No. 11, 1969.

2. Duffy, Gordon W., A Legislator Looks at Health Manpower. Paper read at an Allied Health Conference sponsored by the California Board of Medical Examiners, July 1968.

   Mr. Duffy is a member of the California state legislature. "The proven ability to perform," he says, "is of as much if not more value to an employer and to society as is the potential ability to perform which is evidenced by a diploma or certificate or license."

3. Education for the Allied Health Professions and Services. Washington: U.S. Department of Health, Education, and Welfare, 1967.

   This report of the Allied health Professions Education Subcommittee of the National Advisory Health Council spells out health manpower supply and needs, analyzes the programs for education and training for allied health occupations and their output of trained personnel, and discusses the needs for new programs.

4. Egelston, E. Martin, Exploratory Investigation of Career Mobility Ladders for Health Personnel. Unpublished paper. Chicago: American Hospital Association, March 1970.

   This is a comprehensive but succinct review of the need for, ways of achieving, and problems involved in career mobility in the hospital. A considerable bibliography is included.

5. "The Future of Health Care," a series of articles in the American Journal of Medical Technology, Vol. 36, Nos. 1, 2 and 3, 1970: Perry, Warren, "Career Mobility and Allied Health Education"; Light, Israel, "Growth and Development of New Allied Health Fields"; and a concluding question-and-answer summary.

   These articles comprise the major portion of the 1969 Fisher Scientific Education Series in Medical Technology, presented during the ASMT convention in Philadelphia. Wide-ranging and provocative.

6. Horowitz, Morris A., and Goldstein, Harold M., Hiring Standards for Paramedical Manpower. Boston: Northeastern University, Sept. 1968.

This is a report to the Manpower Administration of the U.S. Department of Labor.

Having studied the job descriptions and personal qualifications of 524 workers in 22 paramedical occupations in hospitals in the Boston area, the authors report that persons with widely differing educational and professional backgrounds are doing the same or similar paramedical tasks. There were slight, if any differences between laboratory technologists and laboratory technicians in distribution of their work time among various functions. Includes specific recommendations for hospitals.

7. Kadish, Joseph, "Career Mobility in the Allied Health Occupations," Proceedings of Symposium on Paramedical Education and Career Mobility. Chicago: Illinois Regional Medical Program, 1968.

A review of the need for optimal use of health manpower, and of the issues related to career mobility: balance between generic and specific training, the development of core courses, opportunity for continuing education, and the need for task analyses, development of new careers, and advancement upward through part-time study.

8. Kissick, William L., "Effective Utilization: The Critical Factor in Health Manpower," American Journal of Public Health, Vol. 58, No. 1, Jan. 1968, pp. 23-29.

A discussion of approaches to improve utilization of personnel in the health professions: (1) downward transfer of functions, (2) new educational programs, using a "theory-skill" continuum in which there are academic and experience equivalents common to several levels of functioning, (3) improved lateral and vertical career mobility, and (4) application of technology.

9. Kuhli, Ralph C., Health Occupations Education. Speech before Health Careers Council of Vermont, Montpelier, Vt., May 1970.

In a general discussion on recruiting for health careers, the author includes a plea for "cumulative levels of education and experience, like rungs in a ladder, so a student could climb as far and as rapidly as time, money and ability would permit." He also suggests that registries of health professionals develop examinations to measure an applicant's ability to perform nationally accepted lists of tasks.

10. Light, Israel, "Development and Growth of New Allied Health Fields," Journal of the American Medical Association, Vol. 210, No. 1, Oct. 6, 1969, pp. 114-120.

Dr. Light argues that task analysis makes it possible to identify required levels of performance, and that equivalency examinations can make mobility possible from one level to the next and beyond.

11. Moxley, John H. III, "The Predicament in Health Manpower," American Journal of Nursing, Vol. 68, No. 7, July 1968, pp. 1486-1490.

A review of the 1967 and 1968 Reports of the National Advisory Commission on Health Manpower, and especially of the Commission's Education Panel, assessing the national problem of lack of health personnel. The panel recommended that a national uniform licensing code be developed for each category of health manpower which requires licensure, and that entrance to the licensing examination be determined by the applicant's school rather than by rigid educational and experience requirements calculated on a "time-served" scale.

12. Perry, J. Warren, "Career Mobility in Allied Health Education," Journal of the American Medical Association, Vol. 21, No. 1, Oct. 6, 1969, pp. 107-110.

This paper was read before the 65th annual Congress on Medical Education sponsored by the AMA Council on Medical Education. Dr. Perry was at that time President of the Association of Schools of Allied Health Professions. He cites six factors needed for career mobility to become a reality.

13. Personnel Qualifications for Medicare Personnel: A Report to Congress. Washington, Department of Health, Education, and Welfare, Dec. 1968.

The findings of a panel on standards for paramedical personnel covered by provisions of the Medicare Program.

14. Phillips, Charles W., Scudder, Harvey I., and Kramer, Lucy M., "Job Development and Training for Workers in Health Services," Health, Education and Welfare Indicators, August 1966.

A report of a conference jointly sponsored by the Departments of Labor and of Health, Education, and Welfare, and including representatives of labor, management, education, health organizations, government, professional associations, and other interested groups. Among the recommendations: "That job ladders and opportunities for career advancement be provided for qualified workers in health services."

15. Randal, Judith, "Ladders to Health Careers Needed," Washington Evening Star, Oct. 30, 1969.

This editorial page article states the need for new categories of assistants in the health field, and for upward mobility.

16. Report to the President and the Congress on Allied Health Professions Personnel Training Act of 1966, as Amended. Washington: U.S. Department of Health, Education, and Welfare, 1969.

Prepared in the Division of Allied Health Manpower, Bureau of Health Professions Education and Manpower Training, National Institutes of Health, this report provides information on programs funded through the Act. It charts health manpower requirements and probable supply and examines education and training needs in the allied health field.

17. Training Health Service Workers: The Critical Challenge. Washington: U.S. Department of Labor and U.S. Department of Health, Education, and Welfare, 1966.

Report of the proceedings of a Conference on Job Development and Training for Workers in Health Services. This is an overview of health manpower needs.

MOBILITY AND TESTING IN THE MEDICAL LABORATORY FIELD

18. Baxter, Sister Marguerite, O.S.B., "Getting More from Laboratory Manpower and Equipment," Hospital Progress, Vol. 48, No. 1, Jan. 1967, pp. 80-86.

The author urges that laboratories recognize a realistic relationship between job requirements and educational background, using a diversity of personnel with a range of skills.

19. Bierman, Pearl, Myers, Beverlee A., Rodak, John, and Reibel, Jay S., M.D., "Certifying Independent Laboratories Under Medicare," Public Health Reports, Vol. 83, No. 9, Sept. 1968, pp. 731-739.

A description of the development of an examination for certain directors of independent laboratories whose education and experience did not otherwise qualify them to participate in the Medicare program. Other information is given about independent laboratories and their compliance with Medicare's conditions of coverage.

20. Brown, Roma, MT(ASCP), *Career Mobility: An Inquiry by a Health Profession Organization*. Paper read at the annual meeting of the Association of Schools of Allied Health Professions, Nov. 1969.

Considering the role of professional organizations in developing career mobility, the author examines how the concept of career mobility applies in the recruitment phase, the commitment phase, the training and education phase, and the job performance phase of an individual's health career. Miss Brown is President of the American Society of Medical Technologists.

21. "Canadian Laboratory Leader Details Progress in Field," *Lab World*, Oct. 1969, pp. 1270-71.

An interview with Peter Hills, president of the Canadian Society of Laboratory Technologists, in which he describes the training and certification of laboratory personnel in Canada.

22. Levine, Harold G., "Career Ladders and Equivalency Examinations: What Does It All Mean?" *American Journal of Medical Technology*, Vol. 35, No. 11, Nov. 1969, pp. 714-720.

The Director of Education of the A.S.M.T. says that while individuals who have mastered skills outside of formal educational programs should receive credit for them, it is difficult to implement this idea.

23. *Manpower for the Medical Laboratory: Proceedings of a Conference of Government and the Professions*. Washington: U.S. Department of Health, Education, and Welfare, 1967.

Among other things, the conference recommended that "representatives of medical laboratory disciplines should initiate efforts with educational testing specialists to develop equivalency tests to provide increased mobility between levels and categories of laboratory careers."

24. Peery, Thomas M., *Laboratory Medicine: Careers and Challenges*. Presidential Address delivered at the Annual Meeting of the American Society of Clinical Pathologists, Chicago, Illinois, Sept. 18, 1969, published in *Laboratory Medicine*, Vol. 1, No. 1, Jan. 1970, pp. 32-35.

Making a strong plea for career mobility and better utilization of laboratory personnel, the A.S.C.P. 1968-69 President describes the career ladder as it could be in the medical laboratory. He advocates single-category programs on the lowest level, which an individual could combine over a period to form the equivalent of training as a medical technologist.

25. "Personnel Relations Handbook," published by A.S.M.T. as part of *Cadence*, Vol. 1, No. 2, pp. 17-28, March 1970.

Includes a chapter on job titles, classifications and descriptions, including introductory remarks about the need for "upward mobility".

26. *Prediction of Job Performance for Negro and White Medical Technicians*. Princeton, N.J., Education Testing Service, 1969.

A series of reports resulting from a project jointly sponsored by the U.S. Civil Service Commission and the Educational Testing Service aimed at identifying tests which are good predictors of job performance and which do not discriminate against certain cultural subgroups.

Three are comprehensive progress reports published by the Educational Testing Service in April 1969. Four are papers given at a symposium of the American Psychological Association in Washington, D.C., in September 1969.

27. *Curriculum Guides for Re-training in Medical Technology*. Wash., D.C.: National Committee for Careers in Medical Technology, May 1967.

The summary of work performed under a contract to "locate inactive medical technologists, promote their return to employment and develop guidelines for the retraining of these inactive medical technologists." The summary includes a section on evaluation of re-trainees.

28. Schaeffer, Morris, Widelock, Daniel, Blatt, Sylvia, and Wilson, Marion E.; "The Clinical Laboratory Improvement Program in New York City. 1. Methods of Evaluation and Results of Performance Tests," *Health Laboratory Science*, Vol. 4, No. 2, April 1967, pp. 72-89.

A report on the first phase of a two-year evaluation of capabilities of all the laboratories in New York City, and the factors which relate to quality of performance. The study concludes that laboratories which perform well consistently are those staffed with highly trained, full time supervisors who provide a close watch over the technical procedures.

29. Wise, Sarah Allene, MT(ASCP), *A Method for the Preparation of a Challenge Examination in Medical Technology*. An unpublished master's degree thesis, University of Vermont, Burlington, Vt. May 1969.

This thesis reports on a project in which the author sets out to prepare an equivalency examination in medical technology, to test it on a varied sample of students, recent graduates and working laboratory personnel, and to evaluate it as an instrument for providing academic credit or partial fulfillment of the requirements for a specific level of employment.

TESTING IN HEALTH PROFESSIONS

30. Charvat, Josef, McGuire, Christine, and Parsons, Victor, *A Review of the Nature and Uses of Examinations in Medical Education* (Public Health Paper No. 36). Geneva: World Health Organization, 1968.

A summary of world-wide practices, listing advantages and disadvantages of the various types of examinations. The authors conclude there is too much emphasis on evaluation of a very limited aspect of knowledge--the ability to recall isolated fragments of information--but that some medical educators are making efforts to make examinations more inclusive. A section on new techniques in testing includes examples of new designs in conventional formats, of simulation techniques, and of attempts to standardize practical tests. The Appendix includes a report on the possibility of an international qualifying examination for achieving equivalence in medical education.

31. Cowles, John T., "A Critical Comments Approach to the Rating of Medical Students' Clinical Performance," *Journal of Medical Education*, Vol. 40, Feb. 1965, pp. 188-198.

A rating form used as a "Clinical Performance Record" at the University of Pittsburgh School of Medicine was devised by collecting "critical comments" -- a variation of the critical incident technique. (See item 104 in this Bibliography).

32. *The Evaluation of Complex Educational Outcomes*. Springfield, Illinois: Illinois Department of Educational Research, 1968.

New techniques for assessing clinical competence of orthopaedic surgeons, developed as part of the Orthopaedic Training Study, are described and their validity and reliability analyzed.

33. Hubbard, John P., Levit, Edithe J., Schumacher, Charles F., and Schnabel, Truman G., Jr., "An Objective Evaluation of Clinical Competence," *New England Journal of Medicine*, 272: 1321-1328, June 24, 1965.

Subtitled "New Technics Used by the National Board of Medical Examiners," this article describes the development and use of the new Part III clinical competence examinations of the National Board.

34. *Instructions for Constructing Test Items in Health Education*. New York: Professional Examination Service, American Public Health Association, 1968.

This booklet includes examples of multiple-choice questions of varying complexities, and deals with the ways of composing such questions.

35. Long, Lillian D., *Testing and Evaluation in Job Redesign and Manpower Utilization*. Paper given at a Job Redesign and Manpower Utilization Seminar, Arlington, Va., Nov. 1968.

A discussion by the Director of the Professional Examination Service of the American Public Health Association of various ways in which testing and evaluation can be used in the health professions.

36. Maquire, Christine H., "The Oral Examination as a Measure of Professional Competence," *Journal of Medical Education*, Vol. 41, March 1966, pp. 267-74.

Weighing its high cost against its low reliability and validity casts doubt on this type of testing as presently done.

37. Miller, George E., "The Orthopaedic Training Study," *Journal of the American Medical Association*, Vol. 206, No. 3, Oct. 14, 1968, pp. 601-606.

The author describes a study underway at the Center for the Study of Medical Education of the University of Illinois for the American Board of Orthopaedic Surgery. The education of orthopaedic surgeons is being reviewed, and old and new forms of evaluating are being developed, tested, and incorporated into the Board's certification examinations.

38. Miller, George E., Ed., *Teaching and Learning in Medical School*. Cambridge, Mass.: Harvard University Press, 1961.

This text includes a major section on "The Evaluation of Learning," detailing the problems involved in evaluating student progress toward determined objectives, and the techniques which can be used in appraising it.

39. Monroe, Russell R., "Techniques for Evaluating the Effectiveness of Psychiatric Teaching," *American Journal of Psychiatry*, Vol. 122, July 1965, pp. 61-67.

An Account of experience with a 40-minute filmed interview used in testing second-year medical students taking courses in psychiatry.

40. Rimoldi, H.J.A., "Rationale and Applications of the Test of Diagnostic Skills," *Journal of Medical Education*, Vol. 38, No. 5, May 1963, pp. 364-68.

The Test of Diagnostic Skills was an attempt to test problem-solving ability--"thinking"--by giving a clinical case history along with questions the candidate may ask.

41. Williamson, John W., "Assessing Clinical Judgment," Journal of Medical Education, Vol. 40, Feb. 1965, pp. 180-187.

A description of a "Patient Management Problems" test in which the candidate goes step by step through a simulated case, making decisions and erasing overlays which give him further information and instructions.

42. Young, Jimmy A., Career Mobility: An Inquiry By An Allied Health Practioner. Paper read at the annual meeting of the Association of Schools of Allied Health Professions, Nov. 1969.

This paper describes a plan for a career ladder in the field of respiratory therapy, and an equivalency examination program devised by faculty members of the Inhalation Therapy Program at Northeastern University.

TESTING NURSES

43. Baccalaureate Education for the Registered Nurse Student: Proceedings of a Conference. New York: National League for Nursing, 1966.

This book contains papers given at a conference to consider the problems of Registered Nurses returning to school to obtain their baccalaureate degrees.

44. Burnside, Mrs. Helen, "Practical Nurses Become Associate Degree Graduates," Nursing Outlook, Vol. 17, No. 4, April 1969, 47.

A description of the credit-by-examination program of the Department of Nursing at Cuyahoga Community College in Cleveland.

45. Flanagan, John C., Gosnell, Doris, and Fivars, Grace, "Evaluating Student Performance," American Journal of Nursing, Vol. 63, No. 11, Nov. 1963, pp. 96-99.

An account of how the critical incident technique, (see item #104 in this Bibliography), was used at a nursing school in Pittsburgh to develop a list of desirable attributes for nursing students.

46. Gerchberg, Louise Rozario, An Observational Method for Evaluating the Performance of Nursing Students. New York: National League for Nursing, 1962.

A report describing a trial application of a program for evaluating the performance of students of nursing in clinical situations.

47. Grant, E. Louise, "The RN Writes Her Own Transfer Credit," Nursing Outlook, Vol. 14, No. 5, May 1966, pp. 39-40.

An explanation of the credit-by-examination program for RN's returning for degrees at the Medical College of Georgia School of Nursing, by the Dean.

48. Heslin, Phyllis, "Evaluating Clinical Performance," Nursing Outlook, Vol. 11, No. 5, May 1963, pp. 344-345.

A review of some of the problems involved in evaluating clinical performance.

49. "Let's Examine the Challenge Examination for the Registered Nurse Student," Nursing Outlook, Vol. 17, No. 4, April 1969, p. 48.

Questions and answers regarding the credit-by-examination system at the University of Arizona College of Nursing.

50. Lyons, William, and Schmidt, Mildred S., "Credit for What You Know," American Journal of Nursing, January 1969, pp. 101-104.

A history of the New York State College Proficiency Examination Program and its examinations for nurses.

51. Ortelt, Judith A., "The Development of a Scale for Rating Clinical Performance," The Journal of Nursing Education, Vol. 5, No. 1, Jan. 1966, pp. 15-17.

A process developed at the University of Hawaii for rating student performance in clinical practice, by comparing anecdotal records on individual performance against a faculty-written list of expected behaviors.

52. Ramphal, Marjorie, "Needed: A Career Ladder in Nursing," American Journal of Nursing, Vol. 68, No. 6, June 1968, pp. 1234-1236.

A professor at the Graduate School of Nursing, New York Medical College, speaks up for more clearly defined nursing positions, and more mobility between them for those whose motivations and life situations change.

53. Slater, Doris, The Slater Nursing Competencies Rating Scale. Detroit, Mich.: Wayne State University College of Nursing, 1967.

This rating scale was developed with a view to enhancing objectivity in ratings of nurse performance in the clinical setting.

54. Smith, Patricia Cain, and Kendall, L.M., "Retranslation of Expectations: An Approach to the Construction of Unambiguous Anchors for Rating Scales", Journal of Applied Psychology, Vol. 47, No. 2, pp. 149-155.

A description of rating scales for use by head nurses evaluating performance of staff nurses.

55. Tate, Barbara L., Test of a Nursing Performance Evaluation Instrument. New York: National League for Nursing, 1964.

A previously constructed rating form was tested to determine its validity, reliability, and practicality. While no firm conclusions could be drawn, the experience indicated further work with this type of form is needed and justified.

GRANTING ACADEMIC CREDIT BY EXAMINATION

56. Allyn, Nathaniel C., "College Credit by Examination," Nursing Outlook, Vol. 17, No. 4, April 1969, pp. 44-66.

A description of the College-Level Examination Program of the College Entrance Examination Board. Its Primary goal is to facilitate access to higher education.

57. Arbolino, Jack N., The Council on College-Level Examinations. New York: College Entrance Examination Board, 1965.

This background report documents the need for methods of evaluating off-campus learning for academic credit and presents a plan for development by C.E.E.B. of a College-Level Examination Program, which has since been established under Mr. Arbolino's direction.

58. Carver, Fred D., "A Re-Entry Route for Yesterday's Dropouts," *Adult Leadership*, April 1967, pp. 357-358.

A report on the use of the General Educational Development tests by the U.S. Armed Forces Institute.

59. *College-Level Examination Program Publications*. New York: College Entrance Examination Board.

College-Level Examination Program, Description and Uses, 1968
Progress Report, January 1969
A Description of the General Examinations, 1968
A Description of the Subject Examinations, 1969
Bulletin of Information for Candidates, 1969-70
Score Interpretation Guide, 1967

These publications explain the nature of the program and of the individual tests, and give information for candidates and for colleges and universities which may consider granting credit.

60. *Community Action Curriculum Compendium*. Washington: National Student Association, 1968.

A descriptive listing of college and university programs which include field work, tutorial work, and other types of community action, usually in conjunction with academic study, and for college credit.

61. *Continuing Education Programs and Services for Women*. Washington: U.S. Department of Labor, Wage and Labor Standards Administration, Women's Bureau, Jan. 1968.

A directory of college programs specially designed for women, including information about whether they allow credit for life experience.

62. Dyer, H.S., and Valley, J.R., *Credit for Off-Campus Achievement*. Princeton, N.J.: Educational Testing Service, Oct. 1962.

This paper proposes a program to give direction and substance to the efforts of people engaged in off-campus studies by providing comprehensive examinations aimed at giving academic credit for such studies.

63. Flaugher, Ronald L., Mahoney, Margaret H., and Messing, Rita B., *Credit by Examination for College-Level Studies: An Annotated Bibliography*. New York: College Entrance Examination Board, 1967.

This very comprehensive bibliography includes sections on (1) the transfer student, (2) students receiving credit by examination, and (3) the unaffiliated student and sources of instruction open to him.

64. Hangartner, Rev. Carl A., S.J., "College Credit Equivalency and Advanced Standing," Nursing Outlook, Vol. 14, No. 5, May 1966, pp. 30-32.

Speaking at the National League for Nursing Conference on Baccalaureate Education, Father Hangartner suggested that measureable goals can be established for the outcomes of educational programs, and that students be evaluated against such goals to determine what more they need to learn rather than to equate their past learning with certain prescribed course offerings.

65. Hanrott, F.G., "Degrees for Workers," New Scientists, Jan 1969.

The registrar and secretary of the British Council for National Academic Awards describes its program for awarding advanced research degrees to individuals at institutions other than universities who do not possess the usual entry qualifications to register for an advanced degree.

66. Hedrick, J.A., "College Credit by Examination," Journal of Higher Education, Vol. 31, No. 4, 1960, p. 212.

The report of a questionnaire study of the policies of 301 colleges and universities in the North Central Association regarding granting credit by examination.

67. Kurland, Norman D., College Credit by Examination for Off-Campus Study. Unpublished report prepared for the College Entrance Examination Board, April 1964.

A Consultant's review of the need for and possibilities for developing an examination system for people who do college-level work outside of regular college programs.

68. Kurland, Norman D., "College Credit for Off-Campus Learning," Nursing Outlook, Vol. 14, No. 5, May 1966, pp. 33-35.

A review for the NLN Conference on Baccalaureate Education of the emerging idea of recognition for out-of-course learning, and a brief history of the development of the New York College Proficiency Examination Program.

69. The New York College Proficiency Examination Program. Albany, New York: State Education Department, 1969.

This booklet describes the New York College Proficiency Examinations and their uses.

70. Opportunities for Educational and Vocational Advancement. Washington, D.C.: American Council on Education, Commission on Accreditation of Service Experience, 1965.

A description of the GED (General Educational Development) Testing Program, the Comprehensive College Testing Program (predecessor of the College Entrance Examination Board's College-Level Examination Program), and the courses and tests offered by the United States Armed Forces Institute.

71. Venn, Grant, Man, Education, and Work: Postsecondary Vocational and Technical Education. Washington, D.C.: American Council on Education, 1964.

One of the major issues considered in this study is: "How can learning regardless of how or where achieved, be given equivalent educational credit?"

TRANSFER FROM MILITARY TO CIVILIAN HEALTH FIELDS

72. Allied Health Personnel: A Report on their Use in the Military Services as a Model for Use in Nonmilitary Health-Care Programs.

This is the report of an Ad Hoc Committee on Allied Health Personnel of the Academy's Division of Medical Sciences. It examines the use of paramedical personnel in the military services and recommends ways to recruit these personnel for the civilian health field when they leave the military service. It mentions the Federal government's Project Transition and Project REMED, and indicates their limitations.

73. Ball, Warren, G., The Role of the AMA in the Utilization of Military Trained Allied Health Personnel. Speech before Association of Military Surgeons, Washington, D.C., November 1969.

The author quotes a 1969 resolution of the AMA House of Delegates encouraging "recruitment into the health professions of health-oriented personnel released from the services." He discusses some of the ways that are presently being tried to accomplish this goal, with particular attention to the program of the Santa Clara County Medical Society, which has counseled discharged medical corpsmen and placed them in jobs and educational programs.

74. Berlow, Colonel Leonard, "How to Recruit Military Personnel for Health Careers," *Hospitals*, Vol. 43, July 16, 1969.

Urges the American Hospital Association members and others who read their journal to make efforts to hire the 30,000 to 50,000 qualified military health personnel now being lost each year to the civilian health field.

75. Goldstein, Joan, *Medical Corpsmen as a Source of Civilian Health Manpower for New Jersey*. Trenton, N.J.: New Jersey State Department of Health, Oct. 1969.

A brief profile of the medical corpsman and his training, a look at some of the innovative programs developed to use these talents, and a review of the ways in which New Jersey might move to utilize this source of manpower through its Task Force on Health Manpower.

76. *Granting Credit for Service School Training*, Bulletin No. 8, Third Edition. Washington: Commission on Accreditation of Service Experience, American Council on Education, Sept. 1968.

This bulletin provides information and suggestions to college admissions officers concerning the evaluation of, and the granting of credit for, service school courses. In addition, it gives information on the advisory services of the Commission.

77. Lambert, Delores, and Carter, Jack L., *Awarding of Credit by Civilian Institutions for Education in the Military*. Rothwestern Army Education Center, 1969.

A listing by colleges, including information obtained from catalogs and questionnaires on whether they award credit for the following courses and examinations: U.S.A.F.I. courses, university correspondence courses, high school GED tests, University of Maryland courses, Defense Language Institute courses, courses of other service schools, and College-Level Examination Program General Examinations.

78. Richardson, Robert Brooks, *Transferring Military Experience to Civilian Jobs*. Washington: U.S. Department of Labor, Oct. 1968.

This report is based on a study of selected Air Force veterans and their transfer to civilian life. It includes information about Project Transition, a Defense Department program to provide educational and training opportunities for men during their final months of service, and about Project REMED, specifically aimed at getting military health personnel into the civilian health fields.

79. Tate, James R., "The Retiring Military Officer: A Challenge to Counselors," *Adult Leadership*, Sept. 1967, pp. 85-86.

In fiscal 1964, some 80,000 enlisted men received high school equivalency certificates after taking GED tests eventually pass.

80. Turner, Cornelius P., *A Guide to the Evaluation of Educational Experiences in the Armed Services*. Washington. Commission on Accreditation of Service Experiences, American Council on Education, 1968.

This volume contains the Commission's evaluations of and suggested academic credit ratings of formal service school training courses given from 1954 through February 1968. It also describes two national testing programs -- the General Educational Development Testing Program and the College-Level Examination Program.

81. Young, Colonel James J., *Former Servicemen of the Army Medical Department: A Profile and Assessment of an Untapped Resource of Allied Health Manpower*, Ph.D. thesis, 1970, University of Iowa, Iowa City, Iowa.

Colonel Young's thesis reports and analyzes results from a questionnaire survey of Army medical corpsmen released in 1968. It documents their educational backgrounds, military experience, post-military occupations, and attitudes toward civilian careers in the health field. Most had at least one year of college. Survey indicated that the inflexibility of civilian health occupations was a prime cause of a small number of transfers from military to civilian health jobs. Large majorities said they would attend junior college if their Army training could qualify them for advanced standing and that they would take equivalency examinations for academic credit or for job placement if they were available.

LICENSURE AND OTHER GOVERNMENTAL REGULATIONS

82. *Conditions for Coverage of Services of Independent Laboratories*. Federal Health Insurance for the Aged; Regulations. U.S. Department of Health, Education, and Welfare; Social Security Administration, 1968. Social Security Administration, P.O. Box 57, Baltimore, Md. 21203.

83. "Educational Qualifications of Public Health Laboratory Workers," American Journal of Public Health, Vol. 57, No. 3, March 1967, pp. 523-531.

This is the report of the Subcommittee on Educational Qualifications of Public Health Laboratory Workers (referred to as "The Hardy Committee" because it was chaired by Albert V. Hardy, M.D.) of the Committee on Professional Education of the American Public Health Association. It was prepared with the aid of the Laboratory Section (now Division) of the National Communicable Disease Center. A major effort to identify the classes of positions in public health laboratories, it examines the functions of such laboratories and recommends a series of five technical grades and seven professional grades.

84. Egelston, E. Martin, and Kinser, Thomas, Exploratory Investigation of Licensure of Health Personnel. Chicago: American Hospital Association, 1969.

A general review of the licensing processes in health occupations, leading to the conclusion that "the licensing process, while worded in the legal definitions of consumer protection and practitioner qualifications, in reality is also a significant means for determining manpower entry, use, mobility and wage costs." Some of the major problems of licensure are discussed and a series of solutions proposed.

85. Frutchtl, Sister Martin Mary, S.S.M., "Should Medical Technologists be Licensed?," Hospital Progress, Vol. 47, No. 11, Nov. 1966, pp. 47-54.

A comparison of laboratory personnel policies at Catholic hospitals in California, where licensing is required, and in New York, where it is not. The author suggests licensure with categories of workers structured from top to bottom as the best assurance that laboratories will combine the talents of the highly trained and lower-level personnel most effectively.

86. Guide Class Specifications for State Public Health Laboratories. Washington: U.S. Department of Health, Education, and Welfare, Oct. 1969.

A joint project of a Committee of the Association of State and Territorial Public Health Laboratory Directors; the Division of Health Standards and Plans, Office of State Merit Systems, Department of Health, Education, and Welfare; and the Laboratory Division of the National Communicable Disease Center, drafting model position class specifications for public health laboratories for use by state governments. This publication emphasizes that increased opportunities should be available to laboratory personnel to obtain that education through educational leave, fellowships, work-study and other training programs.

87. Hershey, Nathan, "An Alternative to Mandatory Licensure of Health Professionals," Hospital Progress, Vol. 50, No. 3, March 1969, pp. 71-73.

The author suggests institutional licensing as a way to combat the problems which have arisen with personal licensing, and would give institutions the responsibility for regulating the provision of services.

88. Licensure of Clinical Laboratories and Personnel -- A Suggested Guide for Preparation of Enabling Legislation. Atlanta, Ga.: National Communicable Disease Center, Nov. 1966.

A model for state licensing legislation. Personnel qualifications are not included.

89. Quality in Health Care: Report of the 1968 National Health Forum. New York: National Health Council, 1968.

The three volumes of this report are: (1) "Challenges and Definitions", (2) "Action Proposals and Discussions", and (3) "Priorities and Resources for Action". They include at least two papers touching on career mobility problems in relation to licensing.

90. "Regulation of Clinical Laboratories and Their Personnel," Suggested State Legislation -- Volume XXVIII. Chicago: The Council of State Governments, 1969.

A model for state licensing legislation. Personnel qualifications are not included.

91. Shimberg, Benjamin, and Moe, John V., A Pilot Study to Determine the Feasibility of Investigating Nationally the Impact of Licensing Practices on the Availability and Mobility of Non-Professional Manpower in Occupations Where Skill Shortages Exist. Princeton, N.J.: Educational Testing Service, May 1968.

This study reports on licensing practices in five states for non-professional occupations in which manpower shortages exist. The analysis of the effects of licensing concludes with the finding that "licensing does appear to inhibit both job entry and interstate mobility." Further in-depth research is recommended by the authors.

92. State Licensing of Health Occupations. Washington, D.C.: Department of Health, Education, and Welfare (Public Health Service Publication No. 1758), 1967.

A summary of licensing requirements and procedures in 25 health occupations prepared by the National Center for Health Statistics.

TESTING IN EDUCATION AND INDUSTRIAL FIELDS

93. Baldwin, Thomas S., The Development of Achievement Measures for Trade and Technical Education. Raleigh, N.C. and Urbana, Illinois: North Carolina State University and University of Illinois, 1966-68.

An abstract and 10 progress reports on a project calling for development of achievement tests in the following areas: electronics; electrical; radio and television; automechanics; machinist; air conditioning, heating and refrigeration; and data processing. Such tests, in addition to providing information about effectiveness of training programs, will serve as a tool for research on the aptitudes which are necessary for success, and provide an estimate of a student's probability of success on the job. The next report on the project will be the final one.

94. The Evaluation of Teaching. Washington, D.C.: Pi Lambda Theta, 1967.

Five papers and a colloquy on the possible ways to evaluate teaching through assessing the resulting student behavior in various circumstances.

95. Feasibility of Providing Trade Competency Examinations for Teachers on National Basis. New Brunswick, New Jersey: Rutgers, The State University, 1967.

This is the report of a project which explored the feasibility of developing national competency examinations for evaluating the trade knowledge and skills of potential vocational education teachers. After a study of state examination programs for such persons, and two meetings bringing together delegates from 23 states, the consensus was that national trade competency examinations should be developed.

96. Kazanas, H.C., and Kieft, L.D., "An Experimental Project to Determine More Effective Vocational Teacher Certification Procedures in Michigan by Competency Examinations." Ypsilanti: Eastern Michigan University, August, 1966.

A review of state use of competency examinations for certification and for the granting of college credit for occupational experience toward a B.S. in trade and industrial education. A description of the development of written examinations -- but not oral or performance examinations -- for various trade areas.

97. Koenigsburg, Lewis A., and Reilly, Robert R., An Investigation of the Reliability and Validity of Selected Occupational Competency Examinations and Their Use in Evaluating Prospective Trade and Industrial Teachers. Albany, N.Y.: New York State Education Department, June 1968.

This is the final report of a two-year study of reliability and validity of three New York State competency tests -- for auto mechanics, cosmetology, and machine shop -- used in selecting candidates for teacher preparation in the trade and industrial programs.

98. Lindsey, Margaret, Ed., New Horizons for the Teaching Profession. Washington: National Education Association, 1961.

A report of the NEA Commission on Teacher Education and Professional Standards, which includes the following recommendation: "Attention must be given to equivalency examinations so that students may wisely use that time in advancing from where they are rather than unnecessarily duplicating previous experiences."

99. Occupational Competency Tests: Procedures and Instructions for Construction or Revision. Columbus: Ohio State Department of Education, Division of Vocational Education, 1962.

A guide booklet for construction of competency tests, edited by the Trade and Industrial Instructional Materials Laboratory at Ohio State University's College of Education.

TESTING -- GENERAL REFERENCES

100. Anderssen, B.E., and Nillson, S.G., "Studies on the Reliability and Validity of the Critical Incident Technique," Journal of Applied Psychology, Vol. 58, No. 6, Dec. 1964, pp. 398-403.

Using the critical incident technique, (See item #104 in this Bibliography), to analyze the job of store managers in a Swedish grocery company, the authors studied the results of the technique itself, concluding the method did cover the essential points in the job, and that information collected by this method is both reliable and valid.

101. Cronback, Lee J., Essentials of Psychological Testing, New York: Harper & Brothers, 1960.

An introduction to testing.
Chapter 13 on "Proficiency Tests", pp. 360-401, is of particular interest. Since proficiency tests measure abilities produced on demand, to evaluate instruction fully, it is necessary to supplement proficiency tests with observations and other measures of typical behavior.

102. DuBois, Philip H., Teel, Kenneth S., and Peterson, Robert L., "On the Validity of Proficiency Tests," Educational and Psychological Measurement, Vol. 14, No. 4, Winter 1954, pp. 605-616.

A discussion of four methods of validating proficiency tests: (1) by direct judgment of subject-matter experts, (2) by use of a work sample as a criterion measure, (3) by "class validity," trying the test on two groups which are known to be on different levels of proficiency, and (4) by "curricular validity," comparing the test results of trained and untrained groups. The authors also discuss methods of eliminating extraneous variance from proficiency tests.

103. Fitzpatrick, Robert, and Morrison, Edward J., "Performance and Product evaluation," Chapter of forthcoming revision of Educational Measurement. Washington: American Council on Education, to be published 1970.

The authors describe the types of performance testing, such as situational tests, work samples, games, rehearsed performances, and diagnostic problem-solving tests. They indicate some of the uses to which such tests have been put and deal with the steps involved in constructing them.

104. Flanagan, John D., "The Critical Incident Technique," Psychological Bulletin, Vol. 51, No. 4; July 1954, pp. 327-358.

The initial description of a now widely used method for developing a comprehensive picture of behaviors necessarily associated with performance in a certain position. The method consists of collecting a great number of direct observations of behavior in defined situations. Each action must be critical, in the sense that it must occur in a situation where the purpose or intent seems fairly clear to the observer, and where consequences are not doubtful. Observations are recorded when they are fresh in mind. The accumulated incidents can be classified into an orderly analysis of complex behaviors. The technique has been used in studies of pilots, foremen, school board members, retail salespeople, bombardiers, teachers, people in psychotherapy, and dental students, according to the article's bibliography, and of course in many more in the years since 1954.

105. Foley, John P., Jr., Performance Testing: Testing for What is Real. Wright-Patterson AFB, Ohio: 6570th Aerospace Medical Research Laboratories, June 1963.

This memorandum presents the difficulties involved in developing and administering performance examinations, the dangers of depending on written examinations as substitutes for performance examination, and the fact that there is a lack of research information on the valid substitution of written for performance examination.

106. Fredericksen, Norman, "Proficiency Tests for Training Evaluation," in Psychological Research in Training and Education, Robert Glaser, Editor. Pittsburgh: University of Pittsburgh Press, 1961.

A general discussion of the assessment of training, including the following types of evaluation measures: (1) soliciting opinions, (2) administering attitude scales, (3) measuring knowledge, (4) eliciting related behavior, (5) eliciting what-would-I-do behavior, (6) eliciting lifelike behavior, (7) observing real-life behavior.

107. Orr, David B., "The Critical Incident Technique." Unpublished paper, prepared for seminar on Job Redesign and Manpower Utilization, sponsored by the Division of Allied Health Manpower, Bureau of Health Professions Education and Manpower Training, National Institutes of Health, U.S. Department of Health, Education, and Welfare, November 22, 1968.

A description of the critical incident technique, "a set of systematic and well-defined procedures for gathering dependable observational data in a useful form."

108. Smith, Robert G., Jr., An Annotated Bibliography on Proficiency Measurement for Training Quality Control. Alexandria, Virginia: Human Resources Office, June 1964.

References are grouped under five headings: (1) general papers on proficiency measurement, achievement testing, rationales, and bibliographies, (2) complete manuals for testing programs or performance tests, (3) studies evaluating or describing test methods, (4) descriptions of the rationales and procedures for complete quality control systems, and (5) reports describing tests of various kinds and their development. While many of the listings have to do with basic infantry skills or helicopter pilot training or the proficiency of guided missile personnel, the principles involved carry over into civilian fields.

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